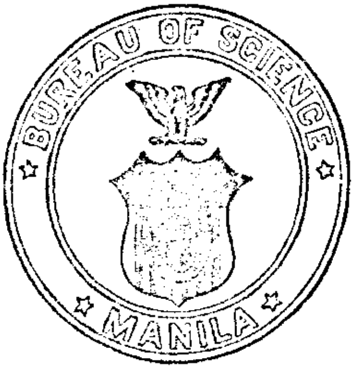
VOL. 28, NO. 2 OCTOBER, 1925

# THE PHILIPPINE JOURNAL OF SCIENCE



MANILA
BUREAU OF PRINTING
1925

212100

# THE PHILIPPINE JOURNAL OF SCIENCE

Published by the Bureau of Science of the Government of the Philippine Islands

WILLIAM H. BROWN, PH.D., *Editor*
R. C. MCGREGOR, A.B., *Associate Editor*

ALBERT H. WELLS, A.B.; GRANVILLE A. PERKINS, PH.D.; A. P. WEST, PH.D.
T. DAR JUAN, A.B., PHAR.D.; F. AGCAOILI, A.B.; A. S. ARGÜELLES, B.S.
*Chemistry*

VICTORIANO ELICAÑO, B.S.; LEOPOLDO A. FAUSTINO, E.M., PH.D.
*Geology*

H. W. WADE, M.D.; OTTO SCHÖBL, M.D.
F. G. HAUGHWOUT; STANTON YOUNGBERG, D.V.M.
*Experimental Medicine*

LIBORIO GOMEZ, M.D., PH.D.; F. CALDERON, B.A., L.M.
VICENTE DE JESUS, M.D.
*Clinical Medicine*

C. F. BAKER, M.A.; L. M. GUERRERO, PHAR.D.
*Botany*

ALBERT C. HERRE, PH.D.; C. F. BAKER, M.A.
LEOPOLDO B. UICHANCO, M.S., SC.D.; W. SCHULTZE
*Zoölogy*

H. O. BEYER, M.A.; OTTO JOHNS SCHEERER, M.A.
*Anhtropology*

ANNA B. BANYEA, *Copy Editor*

Manuscript intended for publication should be sent to the editor. One hundred separates of each paper published in the Journal are furnished to the author without charge. Additional copies may be had at the author's expense if ordered when the manuscript is submitted for publication.

Publications sent in exchange for the Philippine Journal of Science should be addressed: Library, Bureau of Science, Manila, P. I.

The Journal is issued twelve times a year. The subscription price is 5 dollars, United States currency, per year. Single numbers, 50 cents each.

Subscriptions may be sent to the BUSINESS MANAGER, Philippine Journal of Science, Bureau of Science, Manila, P. I., or to any of the agents listed on the third page of this cover.

THE PHILIPPINE
JOURNAL OF SCIENCE

VOL. 28 OCTOBER, 1925 No. 2

# CONTRIBUTION TO THE QUESTION OF DYSENTERY CARRIERS IN THE PHILIPPINE ISLANDS

By ANA VAZQUEZ-COLET

*Of the Biological Laboratory, Bureau of Science, Manila*

In Manila dysenteric infections have often occurred in the household. In that respect bacillary dysentery resembles typhoid fever epidemiologically. Several members of the same family or household are known to have been taken sick with bacillary dysentery, either simultaneously or successively, until gradually the entire family contracted the disease. Such occurrences clearly indicate that the condition known as dysentery carriers exists in Manila and that the sporadic cases throughout the year and the seasonal outbreaks in the Philippine Islands are due to carriers. Thanks probably to improved technic(12) and the care taken to obtain stool specimens in as fresh a condition as possible, we are able to report a study of several cases of dysentery carriers, which has not been done heretofore.

It has been proved that there are typhoid and cholera carriers in the Philippines;(1) the greatest amount of research has been done in connection with cholera vibrio carriers.(13) However, there is lack of laboratory evidence regarding carriers of *Bacillus dysenteriæ.*

The available literature on *Bacillus dysenteriæ* carriers revealed certain data and facts that bear on our present investigation.

Verzár and Weszeczky(18) found 13 per cent of dysentery carriers among 400 examinations. These were convalescents and were afebrile. They also found, during a small epidemic, two chronic carriers, who were the cause of the outbreak, because the members of their household also became infected; and they further found that the intermittent character of dysentery carriers is very pronounced.

Hudson(8) gives the following summary of his study:

> In the case of dysentery here reported, the symptoms of violent diarrhœa and weakness occurred intermittently for about three and a half years after the onset (June, 1918). A strain of *B. dysenteriæ*, Flexner type, was isolated during the latest acute attack (January, 1922). This organism was not found subsequently in a period during which symptoms were absent, even after the use of a laxative. Possibly a relation exists between the organism isolated and the appearance of "clay stools" in 1919; and it may be reasonably conjectured that there was an infection of the gall bladder or of the bile duct at that time, with temporary obstruction.
>
> Specific agglutinins for the Flexner type of dysentery bacillus were found in the blood of the patient, but none for the Shiga type. This agglutination test was made about one hundred forty-five days after the last appearance of symptoms and the successful bacteriologic examination of the fæces. The persistence of agglutinins for at least one hundred forty-five days and the absence of continuous positive cultural findings indicate the value of the agglutination test in the detection of carriers or of persistent chronic cases of the Flexner type of dysentery. The recovery of the pathogen only at the time of the appearance of symptoms points, not only to the chronicity of the infection, but also to the possibility of an alteration in the resistance of the host.

McLeod and Ritchie(11) state:

> In a general way, therefore, we have gathered the impression that freshly prepared emulsions of dysentery bacilli are more specific than those which have stood for a considerable period, i. e., they react well with the sera of infected people, and very little with those of normal individuals. We believe that by controlling from time to time the sugar reactions of a strain and its agglutination, and emulsifying a well-grown agar slope after 18 hours' incubation, always in the same amount of saline, one will probably arrive as near to a standard in connection with agglutination of emulsions of dysentery bacilli as by a more elaborate method.

Speares and Debono(17) draw the following conclusions:

> 1. In an ordinary attack of Shiga a positive agglutination may be expected about the tenth day, and further tests should be made at the end of the second, and if necessary at the end of the third week in case there is a gradual rise in titer.
>
> 2. In Flexner cases a serological diagnosis is not always possible. Frequently the attack lasts only a few days and from the cases we have seen we consider that infection by the Flexner organism does not give rise to as severe an attack of dysentery as Shiga or Y. We may mention that we have not had a death due to infection by this organism.

3. An infection by Shiga raises the titer for the Flexner-Y type, etc.

4. We have not found that the giving of curative sera has any effect on the specific agglutination titer; the titer of the curative sera (lister) used at Tigne was 1 in 320 to Shiga.

5. Failure to obtain agglutination when the disease is clinically of a mild type makes it probable that the infecting organism is of the Flexner or Y type. This probability becomes almost a certainty if the clinical picture and the character of the stools (presence of pus, absence of pathogenic protozoa) point to the case being one of bacillary dysentery.

Cunningham (3) states:

1. A latent form of dysentery exists, which may, when examined, show the presence of varying quantities of mucus or mucus and blood in the stools, and ulcers in the rectum, and may also be secreting dysentery bacilli. Such cases may be compatible with apparent health and are therefore liable to pass undetected.

4. A series of ten successive examinations is sufficient to detect all the cases of latent dysentery present in a population.

Fletcher and Mackinnon (6) review their work as follows:

1. During the 12 months ending May 31, 1918, 935 dysentery convalescents and 847 patients who were convalescent from other diseases, such as enteric and trench fever, were examined in this laboratory.

2. Of 229 dysentery convalescents whose histories were taken—
   29 had had 2 or 3 isolated attacks.
   88 were "chronic" cases.

3. 61 were carriers of *B. dysenteriæ* (Flexner).
   13 were carriers of *B. dysenteriæ* (Shiga).

5. Most of the 88 chronic cases had suffered from recurrent attacks of dysentery over long periods.

7. In the group of 935 dysentery convalescents, 71, or 6.95 per cent, were found to be carriers of dysentery bacilli; 26, or 2.78 per cent, were persistent carriers.

Fifty-eight were Flexner carriers (5.56 per cent) and 13 were Shiga carriers (1.39 per cent).

8. In the group of 847 non-dysentery convalescents there were 9 carriers of dysentery bacilli (1.06 per cent) and 6 of these gave a history of dysentery. These 9 were all Flexner carriers.

9. The 13 Shiga carriers were all persistent carriers.

10. Thirteen out of 61 Flexner carriers were persistent carriers.

11. All the Shiga carriers suffered from chronic dysentery and mental depression, and were unfit for work.

12. With two exceptions the carriers of Flexner's bacillus were in fair health and fit for work, under favorable conditions.

15. The infecting organism is more constantly present in the fæces of Shiga carriers than in carriers of *B. dysenteriæ*, Flexner.

16. One of the chief characters of persistent infections with Flexner's bacillus is intermission.

Dysentery bacilli are quickly overgrown, where there is delay in the examination of the specimens.

Martin, Kellaway, and Williams(10) found twelve organisms isolated culturally and biochemically, which resembled the Flexner group of bacilli but failed to agglutinate with any Y or Flexner serum at their disposal. Eight of the strains were retested with the same serum six months later, when five of them agglutinated fairly well.

Fletcher(5) reports a case whose "excreta have been examined sixty-one times since March 22, 1917, and *B. dysenteriæ* (Shiga) has been isolated on thirty-five occasions; he is now in the seventeenth week and is still a carrier."

Martin and Williams,(9) examining stools of dysentery patients for bacilli during the course of the disease found:

First week, 70 per cent successful recoveries.
Second week, 53 per cent successful recoveries.
Third week, 18 per cent successful recoveries.
Fourth week and later, nil.

They say:

> Our chance of recovering dysentery bacilli rapidly diminished after the first few days. This appeared to be the case whether the stools remained characteristically dysenteric or not.
>
> The muco-pus and epithelial débris discharged in the milder pathological condition, and the necrosed coagulated superficial layers of the mucous membrane in the more serious is, except in the earliest stages of the disease, invaded by hosts of intestinal organisms, which soon overwhelm the dysentery bacilli originally present. This places a serious limit on the value of a bacteriological diagnosis of dysentery. If reliance had been placed on the results of one examination but 15 per cent would have been discovered.

Fletcher(4) says:

> There was not a single instance, during the examination of 1,000 convalescents, of the isolation of dysentery organisms by the Brillians-Greem method, but by direct plating of the fæces on to Endo's medium dysentery bacilli, of the mannite-fermenting group, were isolated from eighteen patients and *B. dysenteriæ* (Shiga) from one.

The present investigation was made in connection with the routine examination of stools for typhoid and dysentery for the Philippine Health Service.(7) The method of examination employed in all cases was as follows: A portion of the stool was emulsified in acid (+ phenolphthalein) bouillon and incubated for from two to six hours at 37° C. From this transplants were made on lactose eosin-methylene blue agar plates. The plates were incubated at 37° C. for twenty-four hours and then examined. Suspicious colonies were picked out and inoculated into Russell's double sugar medium, and the tubes incubated at 37° C. for twenty-four hours. The result of the growth on Russell's medium decided whether or not the cultures should be further transplanted into different sugars, litmus milk, acid bouillon (with a strip of lead acetate paper hanging from the mouth of the tube), and acid agar slants. Macroscopic agglutination was made with polyvalent dysenteric immune serum by emulsifying a portion of the suspicious culture in a 1:100 or 1:200 dilution of the immune serum and then incubating at 37° C. for twenty-four hours. Hanging drops were used for examination as to motility. Gram's stain was applied in every case.

The number of examinations for dysentery carriers from January 1 to December 31, 1924, amounted to 3,328. In the carrier series there was a large group, 2,860, consisting of specimens collected at random and sent to the Bureau of Science by the Philippine Health Service, and a small group, 468, consisting of specimens collected at the Bureau of Science directly from food handlers reporting to the Bureau of Science (by order of the Philippine Health Service). The last-mentioned group comprised specimens passed at the laboratory and examined immediately. It is evident that in these cases the specimen obtained was as fresh as possible for immediate examination. In the large group, 2,860, 7 (0.24 per cent) carriers were detected: 1 Flexner carrier (F. F., studied in this investigation) and 3 Shiga carriers (D. S., J. I., and M. S., studied in this investigation), and 2 Shiga carriers and 1 Flexner carrier, which were not available for further study. In the small group, 468, 7 (1.49 per cent) other carriers were detected; 1 Flexner and Shiga carrier (F. P., reported in this investigation), 3 Flexner carriers (T. N., J. B., and D. G., also reported in this investigation), 2 Shiga carriers (A. E. and J. M., reported in this investigation), and another Flexner carrier whom, so far, we have not been able to locate. That the technic used for isolating the dysentery organism was satisfactory is shown by the relatively high percentage (1.49 against 0.25 per cent) of positives in the small group, and also by the fact that many repeaters were found among the carriers studied, where the specimens were obtained in a fresh condition, just as soon as passed.

Of the carriers discovered, 10 were accessible and were made the object of study. Their histories are as follows:

*Carrier 1, April 3, 1924.*—F. F., 27 years of age, male, Filipino, native of Hagonoy, Bulacan Province, residing in Manila since 1920, and living at 1712 Tioko, Tondo, water carrier by occupation. At 7 years of age he suffered from mucous and bloody diarrhœa with tenesmus for two months, from which he recovered without any treatment, as far as he knows. He denies having suffered from diarrhœa or constipation since then. As far as he can tell, none of the people with whom he has lived have suffered from dysentery. He is a Flexner carrier.

*Carrier 2, May 1, 1924.*—F. P., 21 years of age, male, Filipino, native of Cardona, Rizal Province, and residing there, a student by occupation. He came to Manila on April 28, 1924, to apply for permission to enter the United States. About five years ago he suffered from fever and profuse diarrhœa, not mucoid or bloody, from which he recovered without any treatment. Last year he lived in San Pablo, Laguna Province; in the household a man was suffering from mucous and bloody diarrhœa. Shortly after the man recovered, he (P.) had an attack of fever with abdominal pain and profuse and watery diarrhœa, which lasted one day. Since then up to the present time he has not suffered from diarrhœa. Sometimes he has had abdominal pain. Stool regular. His stools, he says, are often hard and scanty and covered with mucus. He is a Flexner and Shiga carrier.

*Carrier 3, May 12, 1924.*—T. N., 28 years old, male, Filipino, a native of Agno, Pangasinan Province, residing in Manila since 1922, and employed by the Bureau of Agriculture. When a student in Los Baños, Laguna Province, he had diarrhœa for four or five days, with abdominal pain and tenesmus, in which he passed plenty of mucus, but no blood and, as far as he knows, he had no fever during this attack. He denies having suffered from constipation or diarrhœa since then. He is a Flexner carrier.

*Carrier 4, July 11, 1924.*—A. E., 51 years old, female, Filipino, residing at Parañaque, Rizal Province, food handler. At 15 or 16 years of age she suffered from mucous and bloody diarrhœa from which she soon recovered. Denies having suffered from diarrhœa or constipation since then. Bowels move regularly. She is apparently in good health. This woman is a Shiga carrier.

*Carrier 5, July 10, 1924.*—J. B., 35 years old, male, Filipino, residing at 141 Arquiza, Ermita, Manila, food handler. Denies ever having suffered from bloody diarrhœa. Bowels regular. He says he never has abdominal pain or diarrhœa. He is a Flexner carrier.

*Carrier 6, July 10, 1924.*—D. S., 42 years old, male, Filipino, residing at 211 Lardizabal, Sampaloc, Manila, food handler.

He is a strong, healthy-looking man who denies ever having suffered from bloody diarrhœa. He says that sometimes he has diarrhœa and abdominal pain. Otherwise bowels are regular. Stools have no mucus, as far as he can tell. This man is a Shiga carrier.

*Carrier 7, July 21, 1924.*—D. G., 31 years old, male, Filipino, residing at 243 Cabildo, Manila, food handler (ice-cream peddler.) He is a healthy-looking man who denies ever having been sick with bloody diarrhœa. Bowels are regular. This man is a Flexner carrier.

*Carrier 8, August 1, 1924.*—M. S., 25 years old, male, Japanese, food handler, residing at 101 Gastambide, Sampaloc. Says he has had malaria. Last April (four months ago) he suffered from diarrhœa, without fever, without blood or mucus, for a few days. During this time he was not confined to bed at all, for he did not feel ill. He took some Japanese medicine and recovered. He is a Shiga carrier.

*Carrier 9, August 1, 1924.*—J. M., 40 years old, female, Filipino, food handler, residing at Parañaque, Rizal Province. She denies ever having suffered from diarrhœa. She looks healthy. She is a Shiga carrier.

*Carrier 10, September 1, 1924.*—J. I., 32 years old, male, Filipino, residing at 1000 Int. Anak n̄g Bayan, Paco, Manila. Gives a history of having had four attacks of bloody diarrhœa with fever since 1909 up to this time. The last attack occurred about one month ago. He says that he often suffers from abdominal pain. He is a stout, healthy-looking individual. This man is a Shiga carrier.

Carrier 1 was examined eleven consecutive times. Table 1 gives the results of these examinations.

Carrier 2 was examined five times. The first time he was examined, the organism was of the Flexner type. The second time a Shiga type bacillus was isolated. The next two times the Flexner type was again recovered. The last examination was negative. Table 1 shows the results of these examinations.

Carrier 3 was examined eleven times. All of the examinations showed him to be a Flexner type carrier. Table 1 gives the results of these examinations.

Carrier 4 was examined six times; carrier 5 was examined six times; carrier 6 was examined four times; carrier 7 was examined three times; carrier 8 was examined four times; carrier 9 was examined four times; carrier 10 was examined six times. The results of all of these examinations are shown in Table 1.

TABLE 1.—*Showing the results of the cultural study of carriers 1 to 10.*

CARRIER 1.

| Date of examination. | *B. dysenteriæ.* | Carbohydrate reactions. | | | | | Litmus milk. | Lead acetate. | Agglutination. | Motility. | Gram stain. | Indol test. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lactose. | Glucose. | Maltose. | Mannite. | Saccharose. | | | | | | | |
| **1924** | | | | | | | | | | | | | |
| April 4 | + | − | + | + | + | − | + | − | + | − | − | − | |
| April 11 | | | | | | | | | | | | | |
| April 28 | + | − | + | + | + | − | + | − | + | − | − | − | |
| May 3 | − | | | | | | | | | | | | Patient states he is taking a medicine which a certain pharmacist has given to him. |
| May 6 | − | | | | | | | | | | | | Do. |
| May 9 | − | | | | | | | | | | | | Do. |
| May 13 | − | | | | | | | | | | | | Do. |
| May 15 | − | | | | | | | | | | | | Do. |
| May 17 | − | | | | | | | | | | | | Do. |
| May 18 | − | | | | | | | | | | | | Do. |
| May 29 | − | | | | | | | | | | | | Do. |
| June 2 | − | | | | | | | | | | | | Do. |

CARRIER 2.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1924 | | | | | | | | | | | | | |
| May 1 | + | — | + | + | + | — | + | — | + | — | — | + | |
| May 6 | + | — | + | + | — | — | + | — | + | — | — | + | |
| May 8 | + | — | + | + | + | — | + | — | + | — | — | + | |
| May 13 | + | — | + | + | + | — | + | — | + | — | — | + | |
| May 15 | — | — | | | | | | | | | | | |

CARRIER 3.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1924 | | | | | | | | | | | | | |
| May 12 | + | — | + | + | + | — | + | — | + | — | — | + | |
| May 17 | — | | | | | | | | | | | | |
| May 19 | + | — | + | + | + | — | + | — | + | — | — | + | |
| May 21 | + | — | + | + | + | — | + | — | + | — | — | + | |
| May 22 | — | | | | | | | | | | | | |
| May 23 | + | — | + | + | + | — | + | — | + | — | — | + | |
| June 1 | + | — | + | + | + | — | + | — | + | — | — | + | |
| June 2 | — | | | | | | | | | | | | |
| June 7 | + | — | + | + | + | — | + | — | + | — | — | + | |
| June 13 | — | | | | | | | | | | | | |
| June 14 | — | | | | | | | | | | | | |

CARRIER 4.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1924 | | | | | | | | | | | | | |
| July 11 | + | — | + | + | — | — | + | — | + | — | — | + | |
| July 17 | + | — | + | + | — | — | + | — | + | — | — | + | |
| July 21 | + | — | + | + | — | — | + | — | + | — | — | + | |
| July 26 | — | | | | | | | | | | | | She has taken medicine. |
| July 30 | — | | | | | | | | | | | | |
| August 1 | — | | | | | | | | | | | | |

TABLE 1.—*Showing the results of the cultural study of carriers 1 to 10*—Continued.

CARRIER 5.

| Date of examination. | *B. dysenteriæ.* | Carbohydrate reactions. | | | | | Litmus milk. | Lead acetate. | Agglutination. | Motility. | Gram stain. | Indol test. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lactose. | Glucose. | Maltose. | Mannite. | Saccharose. | | | | | | | |
| **1924** | | | | | | | | | | | | | |
| July 11 | + | − | + | + | + | − | + | − | + | − | − | − | |
| July 22 | − | | | | | | | | | | | | |
| July 25 | + | − | + | + | + | − | + | − | + | − | − | − | |
| July 28 | − | | | | | | | | | | | | |
| August 1 | − | | | | | | | | | | | | |
| August 4 | − | | | | | | | | | | | | |

CARRIER 6.

| Date of examination. | *B. dysenteriæ.* | Lactose. | Glucose. | Maltose. | Mannite. | Saccharose. | Litmus milk. | Lead acetate. | Agglutination. | Motility. | Gram stain. | Indol test. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1924** | | | | | | | | | | | | | |
| July 10 | + | − | + | + | − | − | + | − | + | − | − | + | |
| July 23 | − | | | | | | | | | | | | Swab only was obtained. |
| July 29 | − | | | | | | | | | | | | Delayed specimens. |
| August 5 | + | − | + | + | − | − | + | − | + | − | − | + | Came to laboratory and passed a stool while there. |

CARRIER 7.

| Date of examination. | *B. dysenteriæ.* | Lactose. | Glucose. | Maltose. | Mannite. | Saccharose. | Litmus milk. | Lead acetate. | Agglutination. | Motility. | Gram stain. | Indol test. | Remarks. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1924** | | | | | | | | | | | | | |
| July 21 | + | − | + | + | + | − | + | − | + | − | − | − | |
| July 25 | + | − | + | + | + | − | + | − | + | − | − | − | |
| July 28 | + | − | + | + | + | − | + | − | + | − | − | − | |

## CARRIER 8.

| 1924 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| August 1 | + | − | + | + | − | − | + | − | + | − | − | + |
| August 12 | − | | | | | | | | | | | |
| August 15 | − | | | | | | | | | | | |
| August 19 | − | | | | | | | | | | | |

## CARRIER 9.

| 1924 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| August 1 | + | − | + | + | − | − | + | − | + | − | − | + |
| August 8 | − | | | | | | | | | | | |
| August 18 | − | | | | | | | | | | | |
| August 27 | − | | | | | | | | | | | |

## CARRIER 10.

| 1924 | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| September 1 | + | − | + | + | − | − | + | − | + | − | − | + |
| September 8 | + | − | + | + | − | − | + | − | + | − | − | + |
| September 12 | + | − | + | + | − | − | + | − | + | − | − | + |
| September 18 | + | − | + | + | − | − | + | − | + | − | − | + |
| September 19 | − | | | | | | | | | | | |
| September 25 | − | | | | | | | | | | | |

Blood was obtained from each of these carriers to test the agglutinative power of their sera against their respective dysentery strains and against known dysentery strains kept in stock. The blood was withdrawn from a vein in the arm, and allowed to stand until the serum separated from the clot. Then with a sterile pipette the serum was pipetted off and a portion was inactivated by heating at 56° C. for half an hour. Dilutions were then made of the active and inactivated sera 1:5, 1:10, 1:20, 1:40, 1:80, and 1:160. Agglutination tubes were set up in series of six, each series containing the various dilutions. In these dilutions the corresponding strain of dysentery was emulsified, using for this purpose a twenty-four-hour culture on acid agar. Enough of the culture was emulsified in each dilution to render the liquid distinctly opalescent. The tubes were incubated at 37° C. for twenty-four hours, and at the end of this time the readings were made. The results of these tests are shown in Tables 2 to 11; in these tables, as well as in Table 12, the following symbols are used:

+ + + = complete or almost complete agglutination.
+ + = partial agglutination.
+ = trace of agglutination.
— = no agglutination.

TABLE 2.—*Showing agglutination reactions of the blood serum of carrier 1.*

| Serum. | Dilution. | Flexner carrier 1. | Flexner "known." |
|---|---|---|---|
| Active | 1:5 | +++ | + |
| Do | 1:10 | +++ | + |
| Do | 1:20 | ++ | + |
| Do | 1:40 | ++ | ++ |
| Do | 1:80 | + | + |
| Do | 1:160 | — | + |
| Do | [a] | — | — |
| Inactivated | 1:5 | +++ | +++ |
| Do | 1:10 | +++ | +++ |
| Do | 1:20 | ++ | +++ |
| Do | 1:40 | ++ | ++ |
| Do | 1:80 | + | ++ |
| Do | 1:160 | — | + |
| Do | [a] | — | — |

[a] Control.

TABLE 3.—*Showing agglutination reactions of the blood serum of carrier 2.*

| Serum. | Dilution. | Flexner carrier 2. | Flexner "known." | Shiga "known." | Shiga carrier 2. |
|---|---|---|---|---|---|
| Active | 1 : 5 | — | — | | |
| Do | 1 : 10 | — | — | | |
| Do | 1 : 20 | — | — | | |
| Do | 1 : 40 | + | — | | |
| Do | 1 : 80 | ++ | — | | |
| Do | 1 : 160 | ++ | — | | |
| Do | (a) | — | — | | |
| Inactivated | 1 : 5 | +++ | +++ | +++ | + |
| Do | 1 : 10 | +++ | +++ | +++ | + |
| Do | 1 : 20 | ++ | + | +++ | — |
| Do | 1 : 40 | + | — | +++ | — |
| Do | 1 : 80 | + | — | +++ | — |
| Do | 1 : 160 | — | — | +++ | — |
| Do | (a) | — | — | — | — |

[a] Control.

TABLE 4.—*Showing agglutination reactions of the blood serum of carrier 3.*

| Serum. | Dilution. | Flexner carrier 3. | Flexner "known." |
|---|---|---|---|
| Active | 1 : 5 | + | +++ |
| Do | 1 : 10 | + | +++ |
| Do | 1 : 20 | — | +++ |
| Do | 1 : 40 | — | +++ |
| Do | 1 : 80 | — | ++ |
| Do | 1 : 160 | — | — |
| Do | (a) | — | — |
| Inactivated | 1 : 5 | + | +++ |
| Do | 1 : 10 | + | +++ |
| Do | 1 : 20 | — | +++ |
| Do | 1 : 40 | — | ++ |
| Do | 1 : 80 | — | — |
| Do | 1 : 160 | — | — |
| Do | (a) | | |

[a] Control.

TABLE 5.—*Showing agglutination reactions of the blood serum of carrier 4.*

| Serum. | Dilution. | Shiga carrier 4. | Shiga "known." | Flexner "known." |
|---|---|---|---|---|
| Inactivated | 1 : 5 | — | +++ | +++ |
| Do. | 1 : 10 | ++ | +++ | +++ |
| Do. | 1 : 20 | + | +++ | ++ |
| Do. | 1 : 40 | + | +++ | + |
| Do. | 1 : 80 | — | +++ | — |
| Do. | 1 : 160 | — | +++ | — |
| Do. | (a) | — | — | — |

[a] Control.

TABLE 6.—*Showing agglutination reactions of the blood serum of carrier 5.*

| Serum. | Dilution. | Flexner carrier 5. | Flexner "known." | Shiga "known." |
|---|---|---|---|---|
| Inactivated | 1:5 | +++ | +++ | +++ |
| Do. | 1:10 | +++ | +++ | +++ |
| Do. | 1:20 | +++ | +++ | +++ |
| Do. | 1:40 | +++ | +++ | +++ |
| Do. | 1:80 | +++ | ++ | +++ |
| Do. | 1:160 | +++ | + | +++ |
| Do. | (a) | — | — | — |

[a] Control.

TABLE 7.—*Showing agglutination reactions of the blood serum of carrier 6.*

| Serum. | Dilution. | Shiga carrier 6. | Shiga "known." | Flexner "known." |
|---|---|---|---|---|
| Inactivated | 1:5 | +++ | +++ | +++ |
| Do. | 1:10 | +++ | +++ | +++ |
| Do. | 1:20 | +++ | +++ | ++ |
| Do. | 1:40 | +++ | +++ | ++ |
| Do. | 1:80 | ++ | +++ | — |
| Do. | 1:160 | — | +++ | — |
| Do. | (a) | — | — | — |

[a] Control.

TABLE 8.—*Showing agglutination reactions of the blood serum of carrier 7.*

| Serum. | Dilution. | Flexner carrier 7. | Flexner "known." | Shiga "known." |
|---|---|---|---|---|
| Inactivated | 1:5 | +++ | +++ | +++ |
| Do. | 1:10 | +++ | +++ | +++ |
| Do. | 1:20 | ++ | ++ | +++ |
| Do. | 1:40 | ++ | ++ | ++ |
| Do. | 1:80 | + | + | ++ |
| Do. | 1:160 | — | — | + |
| Do. | (a) | — | — | — |

[a] Control.

TABLE 9.—*Showing agglutination reactions of the blood serum of carrier 8.*

| Serum. | Dilution. | Shiga carrier 8. | Shiga "known." | Flexner "known." |
|---|---|---|---|---|
| Inactivated | 1:5 | +++ | +++ | +++ |
| Do. | 1:10 | +++ | +++ | +++ |
| Do. | 1:20 | +++ | +++ | +++ |
| Do. | 1:40 | +++ | +++ | +++ |
| Do. | 1:80 | +++ | +++ | — |
| Do. | 1:160 | +++ | +++ | — |
| Do. | (a) | — | — | — |

[a] Control.

TABLE 10.—*Showing agglutination reactions of the blood serum of carrier 9.*

| Serum. | Dilution. | Shiga carrier 9. | Shiga "known." | Flexner "known." |
|---|---|---|---|---|
| Inactivated | 1 : 5 | ++ | +++ | +++ |
| Do. | 1 : 10 | ++ | +++ | +++ |
| Do. | 1 : 20 | ++ | +++ | +++ |
| Do. | 1 : 40 | ++ | +++ | +++ |
| Do. | 1 : 80 | ++ | +++ | ++ |
| Do. | 1 : 160 | — | +++ | — |
| Do. | (a) | — | — | — |

a Control.

TABLE 11. *Showing agglutination reactions of the blood serum of carrier 10.*

| Serum. | Dilution. | Shiga carrier 10. | Shiga "known." | Flexner "known." |
|---|---|---|---|---|
| Inactivated | 1 : 2 | +++ | +++ | +++ |
| Do. | 1 : 4 | ++ | +++ | +++ |
| Do. | 1 : 8 | + | +++ | +++ |
| Do. | 1 : 16 | + | +++ | +++ |
| Do. | 1 : 32 | + | +++ | ++ |
| Do. | 1 : 64 | — | +++ | — |
| Do. | (a) | — | — | — |

a Control.

Table 3 shows that the serum of the Flexner and Shiga carrier (carrier 2) agglutinated the Shiga strain isolated from his stool only in 1: 5 and 1: 10 dilutions, whereas it agglutinated a known Shiga strain in as high a dilution as 1:160. In order to obtain further evidence that the Shiga strain isolated from the stool of this carrier was a real Shiga type strain of *B. dysenteriæ*, a rabbit was immunized with this strain in order to carry out cross agglutination. This work on the rabbit was started on May 21, 1924, on 0.1 of a loopful, and by August 23, 1924, it received three slants in one dose. For this purpose twenty-four-hour-old cultures on acid agar were used. The growth was emulsified in salt solution and heated for half an hour at 60° C. The corresponding dose was then injected subcutaneously, in the abdomen, every five days. Sixteen days after the last injection blood was obtained from the ear vein of this rabbit, to test the agglutination power of its serum. The serum was separated from the clot and inactivated at 56° C. for half an hour. The following dilutions of this serum were made: 1: 2, 1: 4, 1: 8, 1: 16, 1: 32, 1: 64, 1: 128, 1: 256, and 1: 512, and four series arranged, 9 small, sterile test tubes in each series. Into each series the different dilutions were distributed, using 0.5 cubic centimeter for each test tube. In the first series the Shiga strain isolated from the stool of carrier 2, and against which this rabbit was immunized, was used. In the second series a known Shiga strain was used. In the third series a known Flexner strain was used. In the fourth series the Flexner strain isolated from the stool of the same carrier (carrier 2) was used. All the cultures used were twenty-four hours old, grown on acid agar slants. The results of these tests are shown in Table 12.

TABLE 12.—*Showing agglutination power of immune serum prepared from carrier 2, Shiga strain.*

| Serum. | Dilution. | Shiga carrier 2. | Shiga "known." | Flexner "known." | Flexner carrier 2. |
|---|---|---|---|---|---|
| Carrier 2, Shiga immune | 1:2 | +++ | +++ | +++ | +++ |
| Do | 1:4 | +++ | +++ | +++ | +++ |
| Do | 1:8 | +++ | +++ | +++ | +++ |
| Do | 1:16 | ++ | +++ | +++ | +++ |
| Do | 1:32 | ++ | +++ | ++ | +++ |
| Do | 1:64 | ++ | +++ | ++ | +++ |
| Do | 1:128 | ++ | ++ | ++ | +++ |
| Do | 1:256 | ++ | ++ | + | +++ |
| Do | 1:512 | ++ | + | + | +++ |
| Do | (a) | — | — | + | — |

a Control.

To test the virulence of the four Shiga strains isolated from carriers 2, 6, M. Rey., and 4, and the five Flexner strains isolated from carriers 1, 7, 3, 2, and 5, the corresponding cultures were injected into white mice subcutaneously, at the root of the tail. All the mice injected with the Shiga strains died, and *B. dysenteriæ*, Shiga type, was recovered from their heart blood. The mice injected with the Flexner strains became sick but did not die, except the mouse injected with the culture from carrier 5, which died twenty days after injection, from some other cause. The rest of the mice that remained alive as well as a normal control mouse, received one slant of a twenty-four-hour culture on acid agar of a known virulent Shiga strain. The carrier-1, the carrier-7, and the control mice died within one day after injection, and *B. dysenteriæ*, Shiga type, was recovered from their heart blood. The carrier-3 mouse died three days after injection, but *B. dysenteriæ* Shiga was not recovered from its heart blood.

From each of the first four Shiga strains isolated from carriers 2, M. Rey., 4, and 6, toxin was prepared, as follows: From each strain ten acid agar slants were planted. The cultures were incubated forty-eight hours. The growth was washed off, using 2 cubic centimeters of salt solution for each culture tube. The emulsion thus obtained was poured into an Erlenmeyer flask containing glass beads, and shaken. Then it was heated at 60° C. for one hour, carbolized to contain 0.5 per cent phenol, and stored in the ice box. Then it was filtered through a Berkefeld filter. One cubic centimeter of the filtrate was injected intravenously into a rabbit weighing between 1,500 and 1,800 grams.

The rabbit injected with the carrier-2 Shiga toxin died seven days after injection. It was posted and examined. No dilation of the urinary bladder was observed; nor were hæmorrhages or œdema of the mucous membrane of the cæcum noted. There was only hyperemia of the peritoneal cover of the intestines.

The rabbit injected with the carrier-4 Shiga toxin showed paralysis of the front legs on the eighth day after injection, and remained paralyzed for three days. On the fourth day it recovered.

The rabbits injected with the carrier-6 Shiga toxin and the M. Rey. Shiga toxin showed no symptoms, although as much as 5 cubic centimeters of the toxin was injected. The animals were observed for two weeks after the last injection, but they never showed any symptoms of dysentery toxin.

## DISCUSSION

The nature of dysentery carriers is not well established. It is unlikely that the gall passages are invaded at all by *B. dysenteriæ*. Chronic inflammation and eventually ulceration of the large intestine would seem to offer a more plausible explanation for the persistence of the carrier state in bacillary dysentery; the histories and serological evidence in the ten cases here discussed lend support to this supposition. A study of the distribution of *B. dysenteriæ* throughout the intestinal tract of dysentery cases is necessary before a definite idea can be formed as to the organ or organs responsible for the state of dysentery carriers. Systematic bacteriological examination of autopsies would probably throw much light on this subject.

The discrepancies between the results of the present investigations and the former ones (7) is rather difficult to explain, as the same technic was used. It may be conjectured that the specimens were examined in a fresher condition, or it may be that the outbreak of the present year was more extensive than the one that occurred in 1923. The occurence of the carriers from April (2 carriers) to May (3 carriers), to July (6 carriers), to August (2 carriers), to September (1 carrier), corresponds well to the seasonal annual occurrence of outbreaks of bacillary dysentery in the Philippines. The number of carriers appears to increase parallel to the number of cases. The opinion expressed on another occasion,(7) "That at the present time the chronic carrier is not as serious a factor in the epidemiology of typhoid and dysentery as he has previously been considered to be," must be corrected.

Once the existence of healthy carriers of *B. dysenteriæ* has been demonstrated by laboratory evidence in a relatively high percentage of the food handlers examined, the dysentery carrier must be considered as a serious factor in the epidemiology of bacillary dysentery, at present as well as in the future, even though he remain undiscovered.

## SUMMARY

1. The existence of healthy carriers of *B. dysenteriæ* in the Philippine Islands has been demonstrated.
2. The proof was carried out by isolation of cultures which, according to standard methods of identification, proved to be *B. dysenteriæ*.
3. In 3,328 examinations 14 carriers were found, of whom 7 harbored the Shiga type, 6 the Flexner type, and 1 both Flexner and Shiga types, successively.
4. Agglutination tests were performed with the carriers' sera and with the corresponding culture isolated from the carriers, as well as with stock cultures of the Shiga and the Flexner types. Usually the serum of the carrier agglutinated its own strain to a lesser degree than the stock cultures, and at times a considerable inhibition zone was noticed with the carrier's serum and its own strain.
5. All of the cultures belonging to the Shiga type, isolated from the carriers, were pathogenic for white mice, and some of them were strongly toxic to rabbits. The cultures belonging to

the Flexner type, isolated from carriers, were found to be of low virulence.

## ACKNOWLEDGMENT

Thanks are due to Dr. Otto Schöbl, Bureau of Science, for checking the agglutination and carbohydrate tests under such conditions that the factor of personal equation was eliminated, as well as for other assistance in the preparation of this paper.

## REFERENCES

1. BRILLANTES, CONCHA. The disease-carrier problem in the Philippine Islands. Philip. Journ. Sci. 17 (1920) 109.
2. CROWELL, B. C., and J. A. JOHNSTON. Bacteriologic investigation of fæces and bile of cholera cases and cholera carriers. Philip. Journ. Sci. § B 12 (1917) 85–103.
3. CUNNINGHAM, J. Latent dysentery, with a suggestion of an index for the estimation of the prevalence of dysentery in a community. Indian Journ. Med. Res., Calcutta 6 (1918–19) 68–101.
4. FLETCHER, WILLIAM. Report upon the bacteriological examination of one thousand soldiers convalescent from diseases of the dysentery and enteric groups. Journ. Roy. Army Med. Corps, London 29 (1917) 545.
5. FLETCHER, WILLIAM. Report upon the bacteriological examination of one thousand soldiers convalescent from diseases of the dysentery and enteric groups. Journ. Roy. Army Med. Corps, London 30 (1918) 51.
6. FLETCHER, WILLIAM, and DORIS L. MACKINNON. A contribution to the study of chronicity in dysentery carriers. Natural Research Insurance, Medical Research Committee, Spec. Rep. Ser. No. 29 (1919) 5–31.
7. GARCIA, O., A. VAZQUEZ-COLET, and G. R. LACY. Bacteriological examination of stools of food handlers in Manila. Philip. Journ. Sci. 24 (1924) 735–741.
8. HUDSON, N. P. Journ. Am. Med. Assoc. Chicago 79 (1922) 1676.
9. MARTIN, C. J., and F. E. WILLIAMS. The chance of recovering dysentery bacilli from the stools according to the time elapsing since the onset of the disease. Brit. Med. Journ. London 1 (1918) 447.
10. MARTIN, C. J.; KELLAWAY; and F. E. WILLIAMS. Epitome of the results of the examination of the stools of 422 cases admitted to No. 3 Australian General Hospital, Cairo, for dysentery and diarrhœa—March to August, 1916. Journ. Roy. Army Med. Corps, London 30 (1918) 101.
11. McLEOD, J. W., and A. G. RITCHIE. The serum reaction in bacillary dysentery, observations on agglutination, with special reference to the use of freshly prepared bacillary emulsions. Journ. Path. & Bact., Cambridge 23 (1919–20) 217–223.

12. PAÑGANIBAN, C. S., and OTTO SCHÖBL. Experience with methylene blue-eosin lactose agar in searching for Bacillus dysenteriæ in stools. Philip. Journ. Sci. 14 (1919) 235.
13. SCHÖBL, OTTO. Observations concerning cholera carriers. Philip. Journ. Sci. § B 10 (1915) 11–17.
14. SCHÖBL, OTTO. The influence of bile upon the duration of the state of cholera carriers in experimental animals. Philip. Journ. Sci. § B 11 (1916) 157, 158.
15. SCHÖBL, OTTO. Further study on experimental cholera carriers. Journ. Inf. Dis. Chicago 19 (1916) 145–152.
16. SCHÖBL, OTTO, and C. S. PAÑGANIBAN. Experimental cholera carriers and immunity. Philip. Journ. Sci. § B 12 (1917) 43.
17. SPEARES, J., and P. P. DEBONO. Agglutination in bacillary dysentery. Journ. Roy. Army Med. Corps, London 32 (1919) 430–440.
18. VERZÁR, FRITZ, and OSCAR WESZECZKY. Ueber Bazillenträger bei Flexner-Dysenteriae. Münch. Med. Wochensch. 63 (1916) 291.

# THE POSSIBLE USE OF PHILIPPINE COALS FOR LIQUID FUEL

By V. G. Lava

*Of the Division of Inorganic and Physical Chemistry,*
*Bureau of Science, Manila*

As certain low-grade Philippine coals cannot be used advantageously as such under the boiler because of their rapid disintegration into powder, a study was made with reference to their utilization in the powdered form, by mixing with crude oil. The preparation of this liquid fuel forms the subject of this paper.

Cox[1] characterizes the Philippine coals as "ideal to handle in a producer furnace," and considers that, "For the production of power, the utilization of our low-grade and outcrop coals for producer gas seems much more promising than any other scheme which has yet been devised for their use."

The latest reference found in the literature is that by Bates;[2] namely,

> where petroleum oils are associated with colloidal carbon derived from powdered coal or the like, and maintained in colloidal condition by the action of coal tar, creosote and lime rosin grease, and where powdered coal of larger than colloidal size may also be associated with the fuel.

To obtain a stable mixture for use as fuel in engines, the "suspension-sized" particles are removed from a similar mixture by centrifuging, dilution and sedimentation, or filtration.[3] A British patent for a "fuel to be sprayed on the bed of a furnace" prepares the fuel[4] by grinding into a very fine state a mixture of 5 to 10 parts of tallow, soap, or other fatty substance, 30 parts of coal or other carbonaceous solid, and 59 to 64 parts of crude oil, such as petroleum or tar oil; the mixture is passed through a grinding machine or a colloidal mill.

---

[1] Philip. Journ. Sci. 1 (1906) 901.

[2] U. S. Patent 1447008, February 7, 1923.

[3] Bates, L. W., U. S. Patent 1144723, February 6, 1923.

[4] Leadbeater, J. A., Brit. Patent 191201, October 20, 1921.

Pickering[5] prepared emulsions of paraffin oil in water, using different emulsifiers. He found that solutions of potassium soap, glue, flour, milk, starch, saponin, etc., and insoluble precipitates like calcium oxide, and the basic sulphates of iron and copper act as emulsifiers for this oil. Furthermore, he noticed that solids that are not sufficiently fine-grained, will form "quasi-emulsions," if present in considerable proportions. The "quasi-emulsion" has many of the properties of a true emulsion, but is not homogeneous, and precipitates sooner or later.

Hildebrand and his students[6] cited a case of lampblack as a stabilizer in an emulsion of water in benzene, and from a compilation of data gave a theoretical explanation for the relative stabilizing power of the soaps of caesium, potassium, sodium, calcium, silver, magnesium, zinc, aluminum, and iron. He verified some of his predictions by measurements of the size of the drops formed due to the presence of the soaps. According to his conclusions, the emulsion of oil in water is more stable when potassium soap is used than when sodium soap is used as a stabilizer, while the drops formed with sodium soap are larger.

Although coal alone, in a finely powdered form, might act as an emulsifier for the formation of this "quasi-emulsion" of crude oil, somewhat similar to the patents of Bates (and experiments would seem to indicate that such is really the case), the amount of coal utilized in this way is so small and the coal so fine-grained that for practical purposes this method seems inadequate.

The addition of soap solution to the oil has the effect of producing an emulsion and increasing the viscosity of the liquid medium. It is doubtful that the increase of the viscosity of the medium is the greatest factor in the suspension of the coal particles, but it has been found that the addition of the soap solution effects the suspension of the particles for a few days and produces a soft jellylike mass that does not wet a glass beaker and is easily stirred. The mass seemed to be in equilibrium with the oil left as unused.

According to Stokes,

$$v = \frac{2r^2 \, (s - s_1)g}{9n}$$

---

[5] Journ. Chem. Soc. 91 (1907) 2001.

[6] Journ. Am. Chem. Soc. 45 (1923) 2780.

where,

$v$=rate of fall of the particle in suspension,
$r$=radius of the particle,
$s$=specific gravity of the particle,
$s_1$=specific gravity of the liquid medium,
$g$=gravitation constant,
$n$=coefficient of viscosity of the liquid,

so that, if the radius of the particle were 60 $\mu$, $s-s_1 = 1$, and $n = 0.10$, the velocity of the particle would be 4.7 centimeters per minute. If the radius of the particle were 6 $\mu$, the velocity of the particle would be 2.8 centimeters per hour; and if the radius of the particle were 0.6 $\mu$, the velocity would be 4.7 centimeters per week.

It is evident from Stokes's formula that the greatest factor in the length of suspension of a particle is its diameter. For industrial purposes, however, the grinding of coal to pass a sieve of fineness greater than 200-mesh, may mean so great a cost as to prohibit its utilization. Another great factor in the length of suspension of a particle is the viscosity of the liquid medium, while another one, of no less importance, is the difference between the specific gravity of the medium and that of the particle to be suspended.

## STATEMENT OF THE PROBLEM

The problem is to produce an emulsion of oil, either of sufficient viscosity and with the same specific gravity as that of the coal particles, or of such stabilizing properties as would retain the coal particles (passing through a 200-mesh sieve) in suspended form for a reasonably long time, and take back into suspension the precipitated particles when the mixture is stirred; that is, a "reversible" suspension of coal, the resulting mixture possessing qualities as specified by standard oil tests.

Sheppard[7] outlines some of the possibilities in colloidizing the fuel problem thus:

> (*a*) Production of stable suspensions of coal powders in fuel oils of medium viscosity, stabilized by protective colloids.
>
> (*b*) Production of coal and carbon dispersions of colloid dimensions in oils of lower viscosity, stabilization assisted by protective colloids.

---

[7] The Theory and Application of Colloidal Behavior, edited by R. A. Bogue, McGraw-Hill Book Co., New York 2 (1924) 537; also E. S. Sheppard, Journ. Ind. Eng. Chem. 13 (1921) 37.

(*c*) Semicolloid dispersions of coal by solvent peptization by tars and tar distillates in oils and mixture of oils and tars.

(*d*) Chemical peptization of powdered coals by hydrous and anhydrous oxidizing agents, followed by amalgamation to plastic fuels or stabilization to colloidal fuels.

(*e*) Hydrogenation of coal, of mechanical mixture of coal and oil, of colloid composites of coal and oil, or of coal, tars and oils, including pitches and cognate materials.

It is along the line indicated in (*a*) that we are at present concerned.

The emulsification of crude oil with soap has the effect of increasing the viscosity of the liquid, and the more coal there is suspended, the higher the viscosity of the resulting mixture becomes, so that in the suspension of the coal particles, there results the advantage of this increase in the time of their suspension aside from the increase due to the emulsification with the soap.

## MATERIALS USED

Four kinds of Philippine coal were used; namely, the Gotas, the East Batan, the Butong, and the Cebu. The Gotas, which is mined in Zamboanga, Mindanao, is bituminous; it is generally sold in small lumps, and disintegrates slightly. The East Batan coal is lignitic; it disintegrates on exposure to the air, and has a tendency toward spontaneous combustion. The Butong coal comes from Mindanao; it is a semi-anthracite, and is generally not readily combustible in furnaces designed for bituminous coal. The Cebu coal is lignitic; it disintegrates on ordinary exposure, and is liable to spontaneous combustion if the pile is a meter thick. The sample used was dry, as it had been standing for a long time. The proximate analyses of these coals are as follows:

TABLE 1.—*Analyses of coals used in liquid fuel experiments.*

| Coal. | Moisture. | Volatile combustible matter. | Fixed carbon. | Ash. |
|---|---|---|---|---|
| | *Per cent.* | *Per cent.* | *Per cent.* | *Per cent.* |
| Gotas | 3.16 | 24.08 | 61.12 | 11.64 |
| East Batan | 9.38 | 43.83 | 38.74 | 8.05 |
| Butong | 2.60 | 11.26 | 74.52 | 11.62 |
| Cebu (Uling) | 1.85 | 32.28 | 42.28 | 23.59 |

In all the experiments coal particles which passed through a 200-mesh sieve were used. Therefore, although the maximum radius of the coal particles is about 30 μ, the minimum is much less, and it may be assumed that a large percentage of the particles have radii ranging from 10 to 20 μ.[8]

The oil is the ordinary crude oil used in the Bureau of Science power plant; the following is a résumé of its properties, as determined by Mr. Walter L. Brooke, of the Bureau of Science:

| | |
|---|---|
| Flash point (United States Bureau of Mines flash-point tester) °C. | 100 |
| Carbon residue (per cent) | 1.82 |
| Viscosity (Saybolt Universal) at— | |
| 26° C. (seconds) | 64.4 |
| 28° C. (seconds) | 61.8 |
| 30° C. (seconds) | 59.8 |
| 32° C. (seconds) | 57.4 |

### PREPARATION OF THE OIL EMULSION AND SUSPENSION

The soap solution was emulsified and the oil was added to this, drop by drop, and the mixture stirred by means of a motor until a fine consistency was reached when the oil can be added in greater quantities at a time, stirring being continued.

For the preparation of the suspension of coal in the oil emulsion, definite quantities of the coal were weighed and the emulsion was gradually added until a definite weight of emulsion had been utilized, the process having been carried on with constant stirring. Reversing the method (that is, adding the carbon to the emulsion), has the effect of destroying the emulsion and thus allowing the rapid settling of the carbon particles.

### PREPARATION OF THE SOAP

From the saponification number of the coconut oil used, it was calculated that 100 grams of the oil require 425.6 cubic centimeters of 0.1 *N* alkali solution. These were mixed, evaporated slowly for a long time with stirring in a water bath, and made up to 500 cubic centimeters. One cubic centimeter of the solution, which may be called *A*, contains, therefore, 0.234 gram of sodium soap and glycerine, or 0.2475 gram of potassium soap and glycerine.

[8] According to H. Kreisinger and J. Blizard, the size of the coal particles passing through a 200-mesh sieve varies from 2 μ to 60 μ, most of them having a mean diameter of between 20 μ and 60 μ. Journ. Ind. Eng. Chem. 15 (1923) 249–251.

TABLE 2.—*Relation of soap and water contents to stability of the emulsion and suspension.*

| Sample No. | Soap content. | Water content. | Oil content. | Life emulsion. | Life suspension. | Remarks on suspension. |
|---|---|---|---|---|---|---|
| POTASSIUM SOAP. | | | | | | |
| | *Per cent.* | *Per cent.* | *Per cent.* | *Days.* | *Days.* | |
| 1 | 4.5 | 13.9 | 81.6 | 90 | 120 | Easy to stir. |
| 2 | 3.6 | 10.9 | 85.5 | 90 | 120 | Do. |
| 3 | 2.5 | 7.7 | 89.8 | 49 | 120 | Do. |
| 4 | 1.5 | 4.0 | 94.5 | 2 | 2 | Hard to stir. |
| 5 | 2.2 | 16.1 | 81.7 | 7 | 120 | Easy to stir. |
| 6 | 1.8 | 12.6 | 85.6 | 4 | 120 | Do. |
| 7 | 1.3 | 8.8 | 89.9 | 2 | 120 | Do. |
| 8 | 0.5 | 4.7 | 94.8 | 1 | 14 | Hard to stir. |
| 9 | 1.2 | 17.1 | 81.7 | 4 | 120 | Easy to stir. |
| 10 | 0.8 | 13.5 | 85.7 | 2 | 120 | Do. |
| 11 | 0.5 | 9.5 | 90.0 | ([a]) | 14 | Hard to stir. |
| 12 | 0.3 | 5.0 | 94.7 | ([a]) | ([a]) | Do. |
| 13 | 0.4 | 17.8 | 81.8 | 3 | 5 | Do. |
| 14 | 0.3 | 14.0 | 85.7 | 2 | 5 | Do. |
| 15 | 0.2 | 9.8 | 90.0 | 1 | ([a]) | Do. |
| 16 | 0.15 | 5.15 | 95.7 | ([a]) | ([a]) | Do. |
| SODIUM SOAP. | | | | | | |
| 1 | 4.2 | 14.2 | 81.6 | 90 | 120 | Easy to stir. |
| 2 | 3.3 | 11.2 | 85.5 | 60 | 120 | Do. |
| 3 | 2.35 | 7.8 | 89.8 | 3 | 120 | Do. |
| 4 | 1.2 | 4.1 | 94.7 | 0.5 | 1 | Hard to stir. |
| 5 | 2.1 | 16.2 | 81.7 | 4 | 120 | Easy to stir. |
| 6 | 1.7 | 12.7 | 85.6 | 3 | 120 | Do. |
| 7 | 1.2 | 8.9 | 89.8 | 0.84 | 60 | A little hard to stir. |
| 8 | 0.6 | 4.7 | 94.7 | ([a]) | ([a]) | Hard to stir. |
| 9 | 1.1 | 17.2 | 81.7 | 5 | 7 | Easy to stir. |
| 10 | 0.9 | 13.5 | 85.6 | 3 | 7 | A little hard to stir. |
| 11 | 0.6 | 9.6 | 89.8 | 1 | 2 | Hard to stir. |
| 12 | 0.3 | 5.0 | 94.7 | ([a]) | ([a]) | Do. |

[a] Instantaneous.

## EFFECT OF WATER CONTENT AND SOAP CONTENT ON THE EMULSION

In order to determine the effects of the water and soap content of the emulsion on its stability, different mixtures containing different amounts of soap and water and the same amount of crude oil were prepared. One series of emulsions was prepared so as to contain 10, 20, 30, and 40 cubic centimeters of soap solution *A*, respectively, and 200 cubic centimeters of oil. The other series contained 10, 20, 30, and 40 cubic centimeters of aqueous soap solutions of dilution A/2, A/4, and A/10, respectively, and 200 cubic centimeters of oil.

A portion of each emulsion was used for the preparation of the corresponding suspension.

A comparison of the different emulsions in each series shows that the emulsions containing more water and soap are softer and more stable. The emulsion containing 200 cubic centimeters of oil and 10 cubic centimeters of A/10 soap solution was very hard but coagulated within a few minutes; the emulsion containing 200 cubic centimeters of oil and 40 cubic centimeters of A/1 soap solution remained stable for more than three months. The fact that samples like No. 3, which contained 10 cubic centimeters A/1 soap solution per 100 cubic centimeters of oil, have a greater viscosity than samples like No. 5, which contained the same amount of soap but double the amount of water, shows that the high water content is responsible for the low viscosity of the emulsion. However, the soap content has also an effect on the viscosity, as is shown by the fact that, although the time required for, say, No. 1 sample to flow from an Engler viscometer is two hours forty-five minutes at room temperature (28° to 29° C.), the time required for samples 5 and 9, with the same water content but different soap content, is much less; namely, twenty-six and twenty-two minutes, respectively. In general, the smaller the percentage of water, the greater the viscosity but the less the stability of the emulsion; and the greater the percentage of soap, the greater the viscosity and also the stability of the emulsion.

Furthermore, a comparison of Tables 1 and 2 reveals the fact that both of the emulsions and suspensions of potassium soap are more stable than those of the sodium soap.

## EFFECT OF THE SOAP AND WATER CONTENT ON THE SUSPENSION

The smaller the percentage of water and the greater the percentage of soap, the greater the viscosity of the emulsion formed. However, as soon as the emulsion is added to the powdered coal, the viscosity of the resulting mixture decreases. If only a small amount of coal is used, the viscosity decreases considerably, and after a time some residual oil separates at the top; but the more the percentage of coal is increased the greater the viscosity of the suspension becomes and the less the residual oil separated, until a semisolid mixture is formed. In this connection, it may be pointed out that briquets may be produced in this way, adding more and more coal until the mass becomes very solid, and possibly using some kind of binder.

Furthermore, it has been observed that the greater the percentage of both soap and water, the more stable the suspension, that is, the longer the coal particles stay in suspension without showing visible signs of separation from the oil mixture. Even if the percentages of soap and water are large, if the emulsion has been destroyed before mixing with the coal, the resulting suspension is just as if no soap had been added at all (that is, very short-lived) and the precipitated mass is very sticky. As has already been pointed out, the potassium soap produced a greater stability in the suspension. The life of the suspensions varied from two days to more than four months.

## CONDITIONS FOR THE BEST SUSPENSION WITH SOAP

From the different percentages of soap and water used, it was found that the best suspensions were prepared with the following emulsions:

TABLE 3.—*Showing emulsions used for preparing the best suspensions.*

| Sample No. | Emulsion. | | Suspension. | |
|---|---|---|---|---|
| | Water by weight. | Sodium soap. | Water by weight in suspension. | Sodium soap in suspension of 46 per cent coal. |
| | *Per cent.* | *Per cent.* | *Per cent.* | *Per cent.* |
| 1 | 14.2 | 4.2 | 7.7 | 2.3 |
| 2 | 11.2 | 3.3 | 6.0 | 1.8 |
| 3 | 7.8 | 2.4 | 4.2 | 1.3 |
| 5 | 16.2 | 2.1 | 8.7 | 1.1 |
| 6 | 12.7 | 1.7 | 6.9 | 0.9 |
| 7 | 8.9 | 1.2 | 4.8 | 0.7 |

For greater stability of the suspension, that is, for a longer time of settling and greater ease of stirring, emulsions 1 and 5 should be used; the disadvantage in these suspensions is that 7.7 per cent and 8.7 per cent, respectively, of water are present, which decreases the efficiency of the fuels. Suspensions 3 and 7, on the other hand, contain only 4.2 per cent and 4.8 per cent water, respectively, and would therefore have greater fuel value. Suspension 3 has the advantage over suspension 7 in that 3 contains more soap and is therefore more stable, and contains less water. Of course, the most suitable mixture would depend upon the type of burner used, the viscosity, and the available pressure.

## "REVERSIBILITY" OF THE SUSPENSION

While it has been observed that suspension of powdered coal in oil without the aid of soap and water is possible, the time of settling is so short that after one hour the great bulk of the coal settles as a hard sticky mass which is difficult to stir. The more stable the emulsion, the more nearly perfect is the soft jellylike mass which produces no wetting of the beaker, and the easier it is to stir the mass to the original state.

## DIFFERENCES DUE TO THE DIFFERENT VARIETIES OF COAL

Although the maximum percentage of powdered coal in the suspension is approximately the same for all the varieties of coal used, there are differences which may be due to their chemical composition. In this connection, it is interesting to note that the Batan and the Cebu coals, which have fairly high percentages of volatile combustible matter, do not give as good suspensions as the Gotas and the Butong coals, which are low in volatile combustible matter.

Table 4 gives the calorific values of each separate constituent and of their mixtures with soap and water.

TABLE 4.—*Calorific values of each kind of fuel used and of each emulsion and suspension prepared.*[a]

[Observed calorific value of crude oil, 10620; Gotas coal, 7266; Batan coal, 5720; Butong coal, 6765; Cebu coal, 5285.]

| Soap.[b] | Water. | Oil. | Coal. | Observed calorific value. | Calculated calorific value. | Error. |
|---|---|---|---|---|---|---|
| EMULSION. | | | | | | |
| *Per cent.* | *Per cent.* | *Per cent.* | *Per cent.* | | | *Per cent.* |
| 4.2 (A) | 14.2 | 81.6 | ------------ | 9,800 | (c) | |
| 3.3 (A) | 11.2 | 85.5 | ------------ | 9,840 | 9,970 | 1.3 |
| 4.5 (B) | 13.9 | 81.6 | ------------ | 9,790 | (c) | |
| 3.6 (B) | 10.9 | 85.5 | ------------ | 10,150 | 9,980 | 1.7 |
| 2.5 (B) | 7.7 | 89.8 | ------------ | 10,300 | 10,165 | 1.3 |
| GOTAS COAL SUSPENSION. | | | | | | |
| 1.8 (A) | 6.0 | 46.2 | 46.0 | 8,670 | 8,675 | 0.0 |
| 1.1 (A) | 8.7 | 44.2 | 46.0 | 8,380 | 8,275 | 1.2 |
| 0.9 (A) | 6.9 | 46.2 | 46.0 | 8,420 | 8,435 | 0.2 |
| 0.7 (A) | 4.8 | 48.5 | 46.0 | 8,720 | 8,630 | 1.0 |

[a] According to E. S. Sheppard, "The percentage of dispersed solid phase must be of the order of 30 per cent or upwards by weight, in order to secure economically significant results." This is why no effort has been made to determine the calorific value of any mixture below 37 per cent coal.

[b] (A) denotes that sodium soap is used; and (B) denotes that potassium soap is used.

[c] The heat values corresponding to the soap contents of these particular samples are taken as the basis of calculation, that is 270 calories to 1 per cent sodium soap, and 250 calories to 1 per cent for potassium soap.

TABLE 4.—*Calorific values of each kind of fuel used and of each emulsion and suspension prepared*—Continued.

| Soap. | Water. | Oil. | Coal. | Observed calorific value. | Calculated calorific value. | Error. |
|---|---|---|---|---|---|---|
| **BATAN COAL SUSPENSION.** | | | | | | |
| *Per cent.* | *Per cent.* | *Per cent.* | *Per cent.* | | | *Per cent.* |
| 2.1 (A) | 7.5 | 43.2 | 47.0 | 7,780 | 7,785 | 0.0 |
| 1.8 (A) | 5.9 | 45.3 | 47.0 | 7,880 | 7,925 | 0.6 |
| 1.3 (A) | 9.1 | 47.6 | 47.0 | 7,840 | 8,000 | 2.0 |
| 1.1 (A) | 8.6 | 43.3 | 47.0 | 7,540 | 7,525 | 0.2 |
| 0.9 (A) | 6.7 | 45.4 | 47.0 | 7,710 | 7,695 | 0.3 |
| 0.7 (A) | 4.7 | 47.6 | 47.0 | 7,950 | 7,940 | 0.1 |
| **CEBU COAL SUSPENSION.** | | | | | | |
| 2.75 (A) | 8.7 | 50.8 | 37.8 | 7,980 | 8,110 | 1.6 |
| 2.4 (A) | 8.0 | 46.4 | 43.2 | 7,820 | 7,865 | 0.6 |
| 1.9 (A) | 6.3 | 48.6 | 43.2 | 8,030 | 7,965 | 0.8 |
| 1.9 (A) | 4.8 | 55.9 | 37.8 | 8,140 | 8,330 | 2.3 |
| 1.3 (A) | 4.4 | 51.1 | 43.2 | 8,205 | 8,070 | 1.6 |
| 1.3 (A) | 7.9 | 53.0 | 37.8 | 8,085 | 7,990 | 1.1 |
| 2.8 (B) | 8.7 | 50.7 | 37.8 | 7,800 | 8,085 | 3.7 |
| 2.6 (B) | 7.9 | 46.3 | 43.2 | 7,780 | 7,845 | 0.8 |
| 2.2 (B) | 6.0 | 48.6 | 43.2 | 7,940 | 7,980 | 0.5 |
| **BUTONG COAL SUSPENSION.** | | | | | | |
| 2.7 (A) | 8.9 | 51.7 | 36.7 | 8,450 | 8,705 | 3.0 |
| 2.5 (A) | 8.1 | 47.4 | 42.0 | 8,410 | 8,540 | 1.5 |
| 2.1 (A) | 7.0 | 54.2 | 36.7 | 8,735 | 8,810 | 0.8 |
| 2.0 (A) | 6.4 | 49.6 | 42.0 | 8,660 | 8,640 | 0.2 |
| 1.4 (A) | 4.5 | 52.1 | 42.0 | 8,790 | 8,750 | 0.5 |
| 1.4 (A) | 8.0 | 53.9 | 36.7 | 8,630 | 8,575 | 0.6 |
| 2.9 (B) | 8.8 | 51.6 | 36.7 | 8,405 | 8,675 | 3.2 |
| 2.6 (B) | 8.1 | 47.3 | 42.0 | 8,385 | 8,515 | 1.5 |
| 2.4 (B) | 6.8 | 54.1 | 36.7 | 8,660 | 8,770 | 1.3 |
| 2.2 (B) | 6.2 | 49.6 | 42.0 | 8,540 | 8,655 | 1.4 |
| 1.6 (B) | 4.9 | 56.8 | 36.7 | 8,820 | 8,910 | 1.0 |
| 1.4 (B) | 4.5 | 52.1 | 42.0 | 8,695 | 8,730 | 0.4 |

## THEORETICAL

The oil-water-coal mixture has always been referred to as a suspension of coal in the oil-water emulsion. There are indications, however, that the mixture is, partly at least, an emulsion of oil in water, where the particles of coal act as pellicles or as a coating surrounding the oil globules to prevent them from coalescing. It has been pointed out that the jellylike fluid mass, formed after the addition of coal to the oil-water emulsion, does not wet the beaker. This would show that the oil globules are enveloped in some sort of covering. Furthermore, when a small amount of the coal mixture is dropped into a beaker of water, dark mercurylike globules are formed at the bottom; if the oil-water emulsion and the coal particles were entirely independent of each other, there should have been a separation between them in presence of the water, the coal particles falling to the bottom as an irregular mass, and the oil emulsion remaining on the surface of the water and de-emulsifying. Lastly, microscopic analysis shows that there are many oil globules ranging from 2 to 4 $\mu$ in diameter, which are really surrounded by dark coatings, presumably the coal particles, the diameter of the entire globules with their coatings ranging mostly between 40 and 120 $\mu$.

While, therefore, it may not be accurate to state that the mixture is totally an emulsion of oil in water, where the soap and the coal particles act as emulsifiers or stabilizers, it is safe to assume that a portion of this mixture is composed of the emulsion just described, the rest of the coal being simply suspended in the viscous emulsion. Whether it is possible to prepare a complete emulsion of the type described remains to be seen; but, in view of the fact that the globules are very large, it is hardly to be expected that the emulsion would remain permanently.

## SUMMARY

The work undertaken was confined purely to the use of soap solutions for the production of coal suspensions.

Various patents use tar mixed with oil and soap. It may be pointed out that tar mixed with coal produces a very viscous mixture, which does not settle for a long time. When crude oil is mixed with the tar, the suspended carbon in the tar precipitates. When an oil emulsion in water, stabilized by soap, is mixed with the tar, and coal mixed with it, a stable mixture of the fuel is produced. As tar is being produced as a by-product by one of the local manufacturers, experiments were carried out to determine the conditions under which this material could be used as a stabilizer. It was found that there is a wide range within which tar could be utilized. However, in order that the liquid mixture may conform to any specification to be prescribed for its utilization, further experiments are necessary.

Another problem worthy of study is the determination of the maximum diameter of the coal particles that would remain in suspension for a reasonably long time, under varying conditions.

Philippine coal suspensions with soap take the form of a soft jellylike fluid mass which keeps for months. The gross calorific value of the suspension is equal to the sum of the calorific values of each constituent, while, of course, the true heating power will be decreased in proportion to the quantity of water added and water formed by the combustion of the coal.

The study of the behavior of this liquid fuel under ordinary burning conditions would be interesting.

## ACKNOWLEDGMENT

This work was undertaken at the suggestion of Dr. T. Dar Juan, of the Bureau of Science.

# NEW MALAYSIAN CERAMBYCIDÆ; SUBFAMILY LAMIINÆ

By W. S. Fisher

*Of the Bureau of Entomology, United States Department of Agriculture*

This paper gives the results of work on a collection of Cerambycidæ received from Prof. Charles Fuller Baker, dean of the College of Agriculture, University of the Philippines, Los Baños, P. I., to whom I am greatly indebted for the privilege of studying this interesting material.

Nearly all of the species included in the present paper belong to the subfamily Exocentrinæ, as designated by Pascoe;[1] but, under the present classification, they have been distributed among a number of tribes. The beetles in the groups represented are all small and are usually neglected by most collectors, and very little work has been done on the species from the Malaysian Region since Pascoe published his *Longicornia malayana*. Furthermore, since Pascoe had very little material from the regions covered by the present paper, the larger percentage of the species examined are new.

I had intended to make a revised classification of these forms from the Malaysian Region; but, since the species known are scattered over all the islands in that region, and at present material from only a few localities is at hand, it seems advisable at this time simply to describe the new forms, so that the names will be available for use. Perhaps this will stimulate collectors in different parts of the region to search for and secure specimens of these interesting beetles. As soon as sufficient material can be accumulated from the various islands to give us a fair representation of the fauna and a fair knowledge of the distribution and variation of the species, a revisional study will be made of the tribes, the paper to include tables for the separation of the species, so that students will be able to identify the forms from that region.

Through the kindness of Professor Baker, all the types of the new species have been deposited in the United States National Museum.

---

[1] Trans. Ent. Soc. London III 3 (1864) 26-56.

All of the specimens, unless otherwise noted, have been collected by Professor Baker, and much credit is due him for his energetic collecting and his additions to our knowledge of the insect fauna of that region.

**Enispia pulchra sp. nov.**

*Female.*—Head black; pronotum brownish black, with the anterior and posterior margins slightly paler; elytra brownish black, with apical half and a broad band extending obliquely backward from humeri to suture in front of middle reddish yellow; there is also a reddish yellow area at scutellum, and a narrow band of the same color along suture connecting the oblique fasciæ with the posterior reddish yellow area; beneath pale brownish yellow, becoming darker on the median parts.

Head flat between the antennal tubercles, the surface rather densely circumvallato-punctate (each puncture deeply impressed, with an elevated ring around margin), sparsely clothed with short inconspicuous pubescence, and with a few long erect black hairs intermixed; mandibles reddish brown, the margins blackish; palpi yellowish brown. Antennæ uniformly brownish black, densely coarsely punctate, except apex of joints which is smooth, sparsely clothed with short obsolete pubescence, and with short stiff erect hairs and longer flying hairs intermixed; scape feebly arcuate. Pronotum only obsoletely wider than long, base and apex about equal in width; sides feebly arcuate at middle, and parallel on basal fifth; surface transversely grooved near base and anterior margin, the basal groove rather deeply impressed, the anterior one only feebly indicated, nearly smooth, very sparsely clothed with inconspicuous pubescence, and with a few long erect stiff hairs intermixed. Scutellum broadly rounded behind. Elytra distinctly wider than pronotum at base, sparsely, coarsely, and irregularly punctate on basal half, the punctures forming indistinct rows and becoming somewhat scabrous at base, the surface very sparsely clothed with inconspicuous pubescence, each elytron ornated with cinereous pubescence (except the oblique fascia, which is composed of yellowish hairs) as follows: A narrow fascia on the pale area, extending from humerus obliquely backward to near suture, a small vitta along suture behind scutellum, a transverse spot along lateral margin behind humerus, a rather wide, very distinct transverse fascia on anterior part of apical pale area, an obsolete, sparsely clothed transverse fascia at middle, and an obsolete area of sparsely placed hairs near apex; there are also numerous long stiff erect hairs over the entire surface.

Beneath finely densely punctate, and rather densely clothed with moderately long cinereous hairs, the hairs longer and more yellowish on the legs, where there are numerous longer erect stiff ones intermixed; last abdominal segment slightly concave at apex, with an obsolete longitudinal median carina.

Length, 4.2 millimeters; width, 1.5.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality (*Baker 13509*). This species is more closely related to *Enispia venosa* Pascoe than the other species described in the present paper. It differs, however, from that species in a number of ways; the pronotum is nearly glabrous, and the apical half of the elytra reddish yellow, margined anteriorly by a transverse fascia of cinereous hairs, whereas in *venosa* the pronotum is clothed with conspicuous grayish pubescence, and the elytra chestnut brown, with a large grayish blotch covering apical third, and margined anteriorly by an arcuate fascia of cinereous pubescence on each elytron.

**Enispia similis sp. nov.**

*Male.*—Head and pronotum brown, the latter slightly more reddish along anterior and posterior margins; elytra reddish yellow, each elytron ornamented with dark brown markings as follows: A broad crescent-shaped spot at base near scutellum, a broad transverse fascia at middle, with the posterior margin arcuate and distinctly defined and the anterior margin irregular, obsolete, and blending into the pale area, and a rather large irregularly shaped spot at apical fourth, situated closer to suture than to the lateral margin; beneath brownish yellow, femora more or less dark brown.

Head flat between the antennal tubercles, a narrow longitudinal groove extending from occiput to front, the surface sparsely, obsoletely circumvallato-punctate, densely clothed with moderately long yellowish pubescence, and with numerous long erect hairs intermixed; mandibles reddish brown, becoming black at tips; palpi yellowish brown. Antennæ reddish brown, with base of joints paler, densely coarsely punctate, except apex of joints which is smooth, densely clothed with short yellowish pubescence, and with numerous long stiff hairs intermixed; scape slightly arcuate. Pronotum one and one-fifth times as wide as long, distinctly narrower at base than apex; sides strongly arcuate at middle, feebly constricted near apical angles, and parallel on basal fifth; surface deeply transversely grooved near base and anterior margin, nearly smooth, sparsely clothed with inconspicuous brownish pubescence, with a few long erect hairs intermixed, and ornamented with a transverse zigzag median fascia of yellowish white pubescence. Scutellum triangular, rather acutely angulated behind. Elytra distinctly wider than pronotum at base, with rows of irregularly and widely placed punctures, the punctures coarse at base but becoming more obsolete toward apex, the surface rather densely clothed on the dark brown area with short brown pubescence, and on the reddish yellow areas with coarser, longer yellowish white pubescence; there are also numerous long stiff erect hairs over the entire surface. Beneath densely, finely punctate, densely clothed with short whitish pubescence, and with numerous long stiff erect hairs on legs; last abdominal segment broadly rounded at apex; anterior tibiæ slightly swollen at middle; femora with an oblong, more or less depressed area on the outer surface near apex.

Length, 5.5 millimeters; width, 2.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from one male collected at the type locality (*Baker 13508*). This species is very closely related to *Enispia ornata* sp. nov. and *E. fusca* sp. nov. From *ornata* it can be separated by the antennal joints being paler at base, and the dark median spot on the elytra not so distinct, with the posterior margin arcuate and the anterior margin not distinctly indicated. From *fusca* it can be distinguished by the paler color, pronotum not much wider than long, the posterior margin of the dark median spot arcuate, and the last abdominal segment broadly rounded at apex.

**Enispia ornata sp. nov.**

*Male.*—Head and pronotum brown, the latter slightly more reddish along anterior and posterior margins; elytra reddish yellow, each elytron ornamented with dark brown markings as follows: A large triangular spot at base; a small elongate spot along suture behind scutellum; two small spots in the anterior pale oblique area, the external one more or less obsolete; a broad transverse fascia at middle, wider at lateral margin, the posterior margin transverse, and the anterior margin oblique and somewhat irregular; and three more or less distinct spots placed in the form of a triangle in the pale apical area; beneath dark brown, sternum, base of femora, tibiæ, and tarsi brownish yellow.

Head flat between the antennal tubercles, with a narrow longitudinal groove extending from occiput to epistoma, the surface sparsely, obsoletely circumvallato-punctate, rather densely clothed with moderately long yellowish pubescence, and with numerous long erect hairs intermixed; mandibles reddish brown, becoming black at apex; palpi yellowish brown. Antennæ uniformly reddish brown, densely coarsely punctate, sparsely clothed with short cinereous pubescence, and with numerous long stiff erect hairs intermixed; scape not arcuate. Pronotum one and one-fifth times as wide as long, slightly narrower at base than apex; sides rather strongly arcuate at middle, obsoletely constricted near apical angles, and parallel on basal fifth; surface deeply transversely grooved near base and anterior margin, nearly smooth, sparsely clothed with inconspicuous brownish pubescence, with a few yellowish hairs intermixed, but not forming distinct designs, and also with the usual erect hairs. Scutellum broadly rounded behind. Elytra distinctly wider than pronotum at base, with rows of coarse, widely separated punctures, which become obsolete toward apex, the surface rather densely clothed with fine short recumbent brown pubescence on the dark areas, and with slightly coarser whitish pubescence on the reddish yellow areas; there are also numerous long stiff erect hairs over the entire surface. Beneath finely, densely punctate, densely clothed with short recumbent cinereous pubescence, and with numerous longer hairs on the legs; last abdominal segment broadly rounded at apex; anterior tibiæ nearly straight and not swollen at middle; femora with a large oblong flattened area on the outer surface near apex.

Length, 5 millimeters; width, 1.75.

*Type locality.*—Mount Banahao, Luzon, Philippines.

Type in United States National Museum.

Described from one male collected at the type locality.

**Enispia fusca sp. nov.**

*Male.*—Head and pronotum black, the latter with the anterior and posterior margins slightly reddish brown; elytra black, each elytron ornamented with obsolete reddish brown areas as follows: An inconspicuous broad oblique fascia extending from humerus to suture at middle, and the apical third inclosing a number of small irregularly placed dark spots; beneath blackish brown, tips of femora, tibiæ, and tarsi paler reddish brown.

Head flat between the antennal tubercles, with a narrow longitudinal groove extending from occiput to epistoma, the surface sparsely, obsoletely circumvallato-punctate, rather densely clothed with moderately long yellowish pubescence, and with numerous long erect hairs intermixed; mandibles brownish black; palpi yellowish brown. Antennæ reddish brown, the outer joints slightly paler at base, densely coarsely punctate, except apex of joints which is smooth, rather densely clothed with short recumbent cinereous pubescence, and with numerous long stiff hairs intermixed; scape not arcuate. Pronotum one and two-fifths times as wide as long, slightly narrower at base than apex; sides strongly arcuate at middle, feebly constricted near apical angles, and parallel on basal fifth; surface deeply transversely grooved near base and anterior margin, nearly smooth, sparsely clothed with very short cinereous pubescence, and ornamented with a transverse zigzag median fascia of longer yellowish white pubescence. Scutellum broadly rounded behind. Elytra distinctly wider than pronotum at base, with rows of coarse, widely separated punctures, which are somewhat scabrous at base but become more obsolete toward apex, the surface rather densely clothed on the dark areas with inconspicuous blackish pubescence, and on the paler areas with longer, coarser yellowish white hairs; in the anterior oblique area, these yellowish hairs are much denser and longer anteriorly, and form a more or less distinct irregular transverse fascia just behind base; there are also numerous long stiff erect hairs over the entire surface. Beneath densely finely punctate, densely clothed with short recumbent cinereous pubescence, and with numerous longer hairs intermixed, the long hairs becoming stronger and more erect on the legs; last abdominal segment broadly truncate at apex; anterior tibiæ slightly arcuate; femora with a large, more or less depressed area on outer surface near apex.

Length, 6 millimeters; width, 2.25.

*Type locality.*—Cuernos Mountains, Negros, Philippines.

Type in United States National Museum.

Described from a unique male collected at the type locality.

## Genus **CALLIENISPIA** novum

Form of *Enispia*. Head not retractile, subquadrate and convex in front, slightly wider than pronotum and feebly concave between the antennal tubercles, which are rather short and widely separated. Eyes divided (lobes connected by a narrow black band without facets), and widely separated on top. Antennæ slender, 12-jointed, considerably longer than body, and ciliate on underside with long slender hairs; first joint moderately long, not cicatricose at apex, feebly arcuate, subcylindrical; third joint subequal in length to first joint. Pronotum subcylindrical, sides and disk unarmed but with distinct transverse grooves. Elytra elongate, unarmed at base, and clothed with moderately long erect fine hairs (the hairs not stiff and bristling as in *Ebaeides*). Legs moderately long; femora strongly clavate and unarmed at tips; anterior tibiæ arcuate; middle and posterior pairs straight and not emarginate on outer margin near apex; tarsi rather short, narrow, fourth joint subequal in length to joints 1 to 3 united; tarsal claws divergent.

Genotype, *Callienispia elegans* sp. nov.

This genus belongs to the tribe Niphonini and is very closely allied to *Enispia* Pascoe, but the antennæ are longer and slenderer, 12-jointed, and the body is not armed with erect stiff hairs. In the tables given by Pascoe, this genus will run to *Nesomomus* Pascoe, but in that genus the first antennal joint is shorter and the tarsal claws are divaricate, which characters place it in the tribe Acanthocinini.

### **Callienispia elegans** sp. nov.

*Male.*—Elongate, moderately robust and subopaque; above brownish black, elytra slightly paler brown and ornamented with distinct yellowish white pubescent designs; beneath dark brown, the median parts more yellowish.

Head with an obsolete longitudinal carina extending from occiput to epistoma (the carina more or less depressed on vertex) and strongly convex in front; surface sparsely, finely, and irregularly punctate, rather densely clothed with short recumbent cinereous pubescence, with a few long erect fine hairs intermixed; mandibles reddish brown, the tips black; palpi brownish yellow; eyes small, the lower lobes rounded and strongly convex, the upper lobes very narrow and separated from each other on the top by a little less than half the distance that separates the lower lobes on the front. Antennæ twice as long as body, uniformly dark brown, sparsely clothed with short brownish pubescence, except at base of joints 3 to 6 where it is cinereous, and rather densely ciliate on underside with moderately long erect fine hairs; first joint extending to middle of pronotum; third joint subequal in length to first and fourth joints, the following joints slightly shorter and nearly subequal in length. Pronotum quadrate, base and apex about equal in width; sides arcuately rounded at middle and feebly constricted near anterior and posterior angles; surface moderately convex, rather deeply transversely grooved at apical and basal thirds, with a few coarse, widely separated punctures, sparsely clothed with inconspicuous pubescence, except on the median part where it is longer and more conspicuous, and with a few long erect fine hairs intermixed. Scutellum rather large, broadly rounded posteriorly, and densely clothed with cinereous pubescence. Elytra slightly wider than pronotum and feebly depressed on basal half; sides parallel to apical third, then arcuately attenuate to the tips which are separately narrowly rounded; surface with rows of regularly placed coarse punctures, which are somewhat confused in scutellar region, but become more obsolete toward apex, densely clothed with short recumbent brown pubescence, each elytron ornamented with yellowish white pubescence as follows: A narrow undulating transverse fascia near base, slightly wider at lateral margin, and bent obliquely backward at suture; a very irregular narrow fascia near basal third, forming the letter M at middle of elytra; a narrow undulating fascia just behind middle, broadly expanded at lateral margin, and bent obliquely forward to suture near base of the letter M; and apical fourth covered with vermiculate markings, which extend slightly forward along suture. Beneath densely obsoletely punctate and rather densely clothed with moderately long inconspicuous pubescence, with a few long erect hairs on the legs; last abdominal segment broadly rounded at apex.

Length, 4.5 millimeters; width, 1.5.

*Type locality.*—Iligan, Mindanao, Philippines.

Type in United States National Museum.

Described from a single male collected at the type locality.

**Callienispia minuta** sp. nov.

*Female.*—Elongate, moderately robust and subopaque; head and pronotum brownish black; elytra dark brown, more or less yellowish on disk at basal half, and ornamented with distinct silvery white pubescent designs; beneath reddish brown, the median parts yellowish.

Head without longitudinal carina, strongly convex in front and nearly flat between the antennal tubercles; surface sparsely, coarsely punctate, rather densely clothed with moderately long semierect cinereous pubescence, and with long erect fine hairs intermixed; mandibles reddish brown; palpi brownish yellow; eyes rather small, the lower lobes rounded and strongly convex, the upper lobes very narrow and separated from each other on the top by a little less than half the distance that separates the lower lobes on the front. Antennæ nearly twice as long as body, uniformly dark brown, sparsely clothed with short brown pubescence, except the base of the intermediate joints where it is cinereous, and with numerous erect fine hairs which are longer on underside of joints; first joint extending to middle of pronotum; third joint subequal in length to first and fourth joints; the following joints only feebly shorter and nearly subequal in length. Pronotum slightly wider than long, base and apex about equal in width; sides feebly rounded at middle and feebly constricted near anterior and posterior angles; surface moderately convex, rather deeply transversely grooved at basal and apical thirds, with a few coarse, widely separated punctures, sparsely clothed with short inconspicuous pubescence, with a longitudinal median line, and a small spot on each side along anterior margin, of longer silvery white hairs, and with a few long, very fine, erect hairs intermixed. Scutellum somewhat triangular and densely clothed with silvery white pubescence. Elytra slightly wider than pronotum and feebly depressed on basal half; sides parallel to middle, feebly arcuately expanded behind middle, then arcuately attenuate to the tips which are separately narrowly rounded; surface with rows of widely separated punctures, which are coarse on the basal region but become more obsolete toward apex, densely clothed with short brown pubescence, and ornated with silvery white pubescence as follows: A heart-shaped ring on middle of elytra at basal third, connected on each side with a narrow fascia extending obliquely forward to humeri; the ring is also connected on each side posteriorly to a U-shaped mark, with the opening toward base; a narrow fascia extending from the lateral margins obliquely forward to near suture at middle, then bent obliquely backward to suture; and a rounded, vermiculate spot at suture near apex. Beneath densely, obsoletely punctate, rather densely clothed with moderately long recumbent cinereous pubescence, with a few long erect hairs on the legs; last abdominal segment broadly but not deeply depressed at apex.

Length, 4 millimeters; width, 1.3.

*Type locality.*—Singapore, Straits Settlements.

Type in United States National Museum.

Described from a single female collected at the type locality (*Baker 13505*).

### Genus **PLATYZEARGYRA** novum

Head not retractile, transverse, convex in front, slightly wider than pronotum, and flat between the antennal tubercles which are feebly developed and widely separated. Eyes divided (lobes connected by a narrow black band without facets) and widely separated on the top. Antennæ rather slender, 11-jointed, considerably longer than body, and ciliate on underside with long slender hairs; first joint moderately long, not cicatricose at apex, feebly arcuate, and cylindrical; third joint shorter than first joint. Pronotum subcylindrical, sides and disk unarmed but with more or less distinct transverse grooves. Elytra elongate, unarmed at base, and clothed with moderately long erect fine hairs (the hairs not stiff and bristling as in *Ebaeides*). Legs moderately long; femora strongly clavate and unarmed at tips; anterior tibiæ feebly arcuate; middle and posterior tibiæ straight and not emarginate on outer margin near apex; tarsi rather short, narrow, fourth joint about equal in length to joints 1 to 3 united; tarsal claws divergent.

Genotype, *Platyzeargyra bakeri* sp. nov.

This genus belongs to the tribe Niphonini. It is more or less allied to *Egesina* Pascoe, but the antennæ are long and slender, and the body is not clothed with long bristling hairs as in that genus. Superficially it resembles a flattened *Zeargyra* Pascoe without the thoracic and elytral spines.

**Platyzeargyra bakeri** sp. nov.

*Male.*—Elongate, rather robust, and feebly shining; above uniformly black, elytra ornamented with distinct cinereous pubescent designs; beneath brownish black and more or less tinged with yellow.

Head with a narrow longitudinal groove, which is more or less obsolete on front, and elevated into a carina near epistoma, strongly transverse and convex in front; surface coarsely and rather densely punctate, rather densely clothed with short semierect cinereous pubescence, and with numerous long erect fine hairs intermixed; mandibles black; palpi luteous; eyes rather small, the lower lobes rounded and strongly convex, the upper lobes very narrow and separated from each other on the top by half the distance that separates the lower lobes on front. Antennæ about one and one-fourth times as long as body, uniformly brownish black, rather densely clothed with short recumbent pubescence, and rather densely ciliate on underside with long erect brownish hairs; first joint extending to about middle of pronotum, and moderately robust; third joint slightly shorter than first joint, and a little longer than fourth, the following joints gradually diminishing in length. Pronotum quadrate, distinctly narrower at base than apex; sides feebly arcuately rounded to basal fourth where they are slightly constricted; surface moderately convex, broadly transversely depressed along anterior and posterior margins, coarsely, densely, and regularly punctate, sparsely clothed with moderately long recumbent cinereous pubescence, and with numerous long inconspicuous erect hairs intermixed. Scutellum rather large and broadly rounded posteriorly. Elytra about as wide as pronotum in front, and feebly depressed on basal half; sides parallel to apical fourth, then arcuately attenuate to the tips which are separately narrowly rounded; surface with rows of widely separated punctures which are coarse at base but become more obsolete toward apex, rather densely clothed with moderately long recumbent cinereous pubescence, except on apical fourth where the pubescence is brownish, and in the following black areas: A narrow V-shaped space behind scutellum extending from humeri to suture at basal fourth; an irregular space behind the humeral angles, with a narrow obsolete line extending obliquely backward to middle of disk; and a transverse fascia at middle, which is expanded obliquely backward and forward along the lateral margins, and also more feebly backward and forward along suture; the cinereous pubescent areas are narrowly margined anteriorly with more silvery white pubescence, and there are also numerous long inconspicuous erect hairs over the entire surface. Beneath densely, obsoletely punctate, and rather densely clothed with moderately long recumbent cinereous pubescence, with a few longer hairs on the legs; last abdominal segment broadly rounded at apex.

Length, 4.5 millimeters; width, 1.5.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single male collected at the type locality.

### Genus **NEOEGESINA** novum

Head not retractile, transversely oval and feebly convex in front, distinctly wider than pronotum, flat between the antennal tubercles which are short and widely separated, and the sides more or less acutely angulated. Eyes divided (lobes connected by a narrow black band without facets) and widely separated on the top. Antennæ robust, 11-jointed, longer than body, and clothed with long slender erect hairs; first joint moderately long, not cicatricose at apex, feebly arcuate, and subclavate; third joint subequal or slightly shorter than first joint. Pronotum transverse, narrower at base than apex, sides and disk unarmed, but with distinct transverse grooves along base. Elytra elongate, unarmed at base, and clothed with moderately long erect hairs (the hairs not as stiff and bristling as in *Ebaeides*). Legs moderately long; femora strongly clavate, somewhat flattened, and unarmed at tips; anterior tibiæ strongly arcuate; middle and posterior tibiæ straight, not emarginate on outer margin near apex; tarsi short, narrow, fourth joint about equal in length to joints 1 to 3 united; tarsal claws divergent.

Genotype, *Neoegesina ornata* sp. nov.

This genus belongs to the tribe Niphonini, and is closely allied to *Egesina* Pascoe, but differs from it in having the head distinctly wider than pronotum, the pronotum distinctly transverse, much narrower at base than apex, and distinctly transversely grooved near base.

**Neoegesina ornata sp. nov.**

*Male.*—Above brownish black, with basal third of elytra and anterior margin of pronotum reddish brown, and ornamented with cinereous pubescence; beneath brownish black, with the median parts more or less reddish.

Head acutely angulated on each side, with a narrow longitudinal groove extending from occiput to a broad, elevated tooth at epistoma; surface finely and rather densely punctate, sparsely clothed with short recumbent cinereous pubescence, and with a few long fine erect hairs intermixed; mandibles reddish brown, the tips black; palpi brownish yellow; eyes small, the lower lobes elongate, narrow, and acutely convex, the upper lobes narrow and separated from each other on the top by nearly one-third the distance that separates the lower lobes on the front. Antennæ slightly longer than body, uniformly dark brown, sparsely clothed with short brown pubescence, with numerous long erect hairs intermixed, and the intermediate joints narrowly annulated with cinereous pubescence at base; first joint extending to middle of pronotum; third joint subequal in length to first joint, and slightly longer than fourth, the following joints gradually diminishing in length. Pronotum strongly transverse, and distinctly narrower at base than apex; sides arcuately rounded anteriorly, then obliquely attenuate to near posterior angles where they are parallel; surface moderately convex, with two narrow, deeply impressed transverse grooves near base, sparsely, rather coarsely and irregularly punctate, sparsely clothed with short inconspicuous pubescence, and ornated on each side near lateral margin with a rather broad oblique vitta of cinereous pubescence. Scutellum rather large and triangular. Elytra about as wide as pronotum at apex and feebly depressed on basal half; sides parallel to apical third, then arcuately attenuate to the tips which are separately narrowly rounded; surface densely and irregularly punctate, the punctures coarse on basal half but becoming obsolete toward apex, rather densely clothed with short brown inconspicuous pubescence, with numerous fine long erect hairs intermixed, each elytron ornamented with more or less distinct cinereous pubescent markings as follows: The basal half more or less irregularly variegated and a more distinct arcuate spot just behind the middle, extending narrowly backward along suture, and strongly expanded at apex. Beneath finely, densely punctate, and sparsely clothed with moderately long recumbent cinereous pubescence, with a few long erect hairs on the legs; last abdominal segment broadly rounded at apex.

*Female.*—Differs from the male in having the last abdominal segment broadly but very feebly depressed near apex, which is feebly arcuately emarginate.

Length, 4.7 to 5.5 millimeters; width, 1.5 to 1.75.

*Type locality*—Sandakan, Borneo.

*Other locality.*—Singapore, Straits Settlements.

Type, allotype, and paratype in United States National Museum; paratypes in the collection of C. F. Baker.

Described from eight specimens, four males and four females. The type, allotype, and one male and two female paratypes collected at the type locality (*Baker 13507*), and two male and one female paratypes from Singapore, all of which were collected by C. F. Baker. There seems to be no distinct difference between the specimens collected at Singapore and those collected at Sandakan, and there is very little variation among the specimens examined, except in size and that one of the paratypes is more reddish brown, and in some of the other paratypes the elytral markings are not quite as distinct as in the type.

This species resembles in some respects *Egesina rigida*, described by Pascoe from Singapore, but the pronotum is distinctly wider than long, the surface is ornamented with two cinereous pubescent vittæ, and the sides are strongly narrowed posteriorly.

### **Neoegesina varia** sp. nov.

*Male.*—Head black; pronotum and elytra dark brown, the latter ornamented with cinereous pubescence; beneath yellowish brown.

Head not as acutely angulated on sides as in *ornata* sp. nov., with a narrow longitudinal groove extending from occiput to epistoma, but not terminating in a distinct tooth; surface rather densely finely punctate, rather densely clothed with short recumbent cinereous pubescence, with a few long fine erect hairs intermixed; mandibles yellowish brown, the tips black; palpi brownish yellow; eyes small, the lower lobes longer than wide and strongly convex, the upper lobes very small and separated from each other on the top by about half the distance that separates the lower lobes on the front. Antennæ nearly one and one-half times as long as body, uniformly reddish brown, rather densely clothed with short recumbent pubescence, with numerous long erect hairs intermixed; first joint extending to middle of pronotum; third joint slightly shorter than first joint and a little longer than fourth, the following joints gradually diminishing in length. Pronotum strongly transverse and distinctly narrower at base than apex; sides obliquely attenuate from anterior angles to near base where they are strongly constricted; surface moderately convex, with two narrow, deeply impressed transverse grooves along base, coarsely, densely and irregularly punctate, and sparsely clothed with short inconspicuous pubescence. Scutellum transverse and broadly rounded posteriorly. Elytra as wide as pronotum at apex and moderately convex; sides parallel to apical third, then arcuately attenuate to the tips which are separately narrowly rounded; surface densely and irregularly punctate, the punctures coarse on basal half but becoming obsolete toward apex, and nearly concealed by the dense yellowish white pubescence which covers the entire surface except for a narrow space along base, a broad transverse fascia at middle, and a narrow arcuate fascia extending from behind the humeri obliquely backward to the transverse median fascia at suture; in these brown areas the surface is clothed with short brown inconspicuous pubescence, and over the entire surface are numerous fine long erect hairs. Beneath finely densely punctate, and rather densely clothed with moderately long recumbent pubescence, with numerous long erect hairs on the legs; last abdominal segment subtruncate at apex.

Length, 4.8 millimeters; width, 1.5.

*Type locality.*—Sandakan, Borneo.

Type and allotype in United States National Museum.

Described from two specimens, male and female, collected at the type locality (*Baker 13504*). The female differs from the type only in being uniformly black above, darker beneath, and the last abdominal segment broadly but very feebly depressed near apex which is subtruncate.

**Neoegesina fusca sp. nov.**

*Female.*—Above uniformly brownish black, the pronotum and elytra ornamented with narrow cinereous pubescent markings; beneath yellowish brown.

Head acutely angulated on each side, with a narrow longitudinal groove extending from occiput to vertex, becoming obsolete on front, and without a distinct tooth at epistoma; surface finely and rather densely punctate, rather densely clothed with short recumbent cinereous pubescence, and with a few long fine erect hairs intermixed; mandibles yellowish brown, the tips black; palpi brownish yellow; eyes small, the lower lobes elongate, narrow, and acutely convex, the upper lobes very small and separated from each other on the top by less than half the distance that separates the lower lobes on the front. Antennæ slightly longer than body, yellowish brown, rather densely clothed with short brown pubescence, with numerous long erect hairs intermixed, the intermediate joints narrowly annulated with cinereous hairs at base; first joint extending to near base of pronotum; third joint distinctly shorter than first and slightly longer than fourth, the following joints gradually diminishing in length. Pronotum strongly transverse and slightly narrower at base than apex; sides arcuately rounded anteriorly, more obliquely attenuate to near base, where they are feebly constricted and parallel; surface moderately convex, with two narrow, deeply impressed, transverse grooves near base, sparsely, coarsely, and irregularly punctate, sparsely clothed with short inconspicuous pubescence, and ornamented on each side near lateral margins with a broad vitta of cinereous pubescence. Scutellum transverse and broadly rounded posteriorly. Elytra as wide as pronotum at apex, and feebly depressed on basal half; sides parallel to apical third, then arcuately attenuate to the tips which are separately narrowly rounded; surface rather densely punctate, the punctures more or less arranged in rows, coarse on the basal region but becoming more obsolete toward apex, rather densely clothed with recumbent brown pubescence, with numerous long erect hairs intermixed, each elytron ornamented with cinereous pubescent markings as follows: A narrow fascia near basal third, extending transversely from lateral margin to disk, then bent arcuately forward to suture, where it is connected to a narrow fascia extending obliquely forward to the humeral angle; and a narrow, somewhat sinuate transverse fascia at apical third, which extends backward along suture and is slightly bent inward near apex. Beneath finely densely punctate, and rather densely clothed with moderately long recumbent pubescence, with a few long erect hairs on the legs; last abdominal segment broadly but very feebly depressed near apex, which is feebly arcuately emarginate.

Length, 5.5 millimeters; width, 2.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality.

**Neoegesina albomaculata** sp. nov.

*Female.*—Head reddish brown; pronotum and elytra light brown, with a strong yellowish tinge, and ornamented with narrow yellowish white pubescent markings; beneath brownish yellow.

Head not as acutely angulated on sides as in *ornata* sp. nov., with a narrow longitudinal groove extending from occiput to vertex, becoming obsolete on front, and without a distinct tooth at epistoma; surface rather coarsely densely punctate, rather densely clothed with short recumbent yellowish white pubescence, and with numerous long fine erect hairs intermixed; mandibles reddish brown, the tips black; palpi brownish yellow; eyes small, the lower lobes longer than wide and strongly convex, the upper lobes very small and separated from each other on the top by half the distance that separates the lower lobes on the front. Antennæ slightly longer than body, yellowish brown, rather densely clothed with short brown pubescence, with numerous long erect hairs intermixed, and the intermediate joints obsoletely annulated with cinereous pubescence at base; first joint extending slightly beyond middle of pronotum; third joint slightly shorter than first and a little longer than fourth, the following joints gradually diminishing in length. Pronotum slightly transverse and distinctly narrower at base than apex; sides obliquely attenuate from anterior angles to near base, where they are strongly constricted; surface moderately convex, with two narrow, deeply impressed, transverse grooves near base, rather densely, coarsely, and irregularly punctate, sparsely clothed with short inconspicuous pubescence, and ornated with a narrow median fascia and a small spot on each side near anterior margin, composed of yellowish white pubescence. Scutellum somewhat triangular and densely pubescent. Elytra as wide as pronotum at apex, and feebly depressed on basal half; sides parallel to apical third, then arcuately attenuate to the tips, which are separately narrowly rounded; surface rather densely punctate, the punctures coarse on basal half and more or less arranged in rows but becoming obsolete toward apex, rather densely clothed with short brown pubescence, with numerous long erect hairs intermixed, each elytron ornamented with yellowish white pubescent markings as follows: A narrow arcuate band extending from humerus to middle of disk, then backward to lateral margin at apical third, where it is somewhat expanded; a narrow band extending obliquely backward from humeral angle to suture at basal third (to which is connected a narrow band beginning at middle of disk and extending obliquely forward to scutellum), then extending arcuately to middle of disk where it is connected to the external arcuate band, and then continuing backward to suture at apical third; and apical third is more or less irregularly variegated along suture. Beneath finely densely punctate and rather densely clothed with moderately long recumbent pubescence, with a few long erect hairs on the legs; last abdominal segment broadly but very feebly depressed near apex, which is subtruncate.

Length, 5.5 millimeters; width, 2.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality.

### Genus **MIMOGYARITUS** novum

Form of *Gyaritus.* Head not retractile, transverse, convex in front, slightly wider than pronotum, and deeply concave between the antennal tubercles, which are rather strongly developed and widely separated. Eyes nearly divided and rather widely separated on the top. Antennæ robust, 11-jointed, about as long as body, and clothed on underside with long erect hairs; first joint short, not cicatricose at apex, ovate, and extending only a little beyond anterior margin of pronotum; third joint equal in length to first joint. Pronotum subcylindrical, armed at sides with a distinct tooth, disk unarmed but with transverse grooves. Elytra armed with two large spines at base and clothed with long erect stiff hairs. Legs moderately long; femora rather strongly clavate and unarmed at tips; anterior tibiæ slightly arcuate; middle and posterior pairs straight and deeply emarginate on outer margin near apex; tarsi rather short, narrow, fourth joint about equal in length to joints 1 to 3 united; tarsal claws divaricate.

Genotype, *Mimogyaritus fasciatus* sp. nov.

This genus belongs to the tribe Acanthocinini, and superficially resembles the genus *Gyaritus* erected by Pascoe for three species from Sarawak, Borneo. It can, however, be easily distinguished from that genus by the claws being divaricate and the pronotum having a large convex gibbosity on the disk, whereas in *Gyaritus* the claws are divergent and the disk of pronotum is armed with two long acute spines.

**Mimogyaritus fasciatus sp. nov.**

*Male.*—Moderately robust and subopaque; above black, elytra narrowly reddish yellow at base, each elytron ornamented with a narrow transverse angulated velvety black fascia just behind middle; beneath brownish black, the legs slightly reddish.

Head with a narrow longitudinal groove extending from occiput to epistoma, rather strongly convex in front, and the surface nearly smooth, very sparsely clothed with inconspicuous pubescence, and with a few widely separated granules, from which arises a long erect black hair; mandibles black; palpi dark brown; eyes moderately large, the lower lobes longer than wide and strongly convex, the upper lobes narrow and separated from each other on the top by one-third the distance that separates the lower lobes on the front. Antennæ brownish black, except the first joint which is reddish yellow; finely rugosely punctate, sparsely clothed with short inconspicuous pubescence, and with long erect black hairs on underside of joints; first joint slightly longer than wide, very robust, and ovate; third joint equal in length to first and three-fourths as long as fourth, the following joints gradually diminishing in length. Pronotum quadrate, apex and base equal in width; sides parallel, feebly constricted near anterior and posterior angles, and armed on each side with a long, broad tooth placed slightly behind the middle, the tooth acute at tip and bent upward; surface transversely obsoletely grooved at apical and basal thirds, with a large regularly convex gibbosity on disk, and on each side between it and the lateral tooth the surface is longitudinally rugose, sparsely clothed with inconspicuous pubescence, and with numerous large granules, from each of which arises a long erect black hair. Scutellum small and broadly rounded behind. Elytra distinctly wider than pronotum and obsoletely depressed on basal half; sides parallel to apical third, then arcuately attenuate to tips, which are separately narrowly rounded; each elytron armed near base with a rather large broad tooth, placed parallel to suture, the tip bent backward, and armed on the top with a tuft of long black hairs and ornamented with a narrow transverse angulated fascia of velvety black pubescence, apex of angle closer to suture than lateral margin and extending forward; surface with a narrow carina extending from a small tubercle on each side of scutellum to apex, and parallel with suture, with a few granules in the humeral region, densely clothed with very short recumbent cinereous pubescence and with numerous long erect hairs intermixed. Beneath finely densely punctate, rather densely clothed with short recumbent cinereous pubescence, and with a few longer hairs on the legs; first abdominal segment about as long as the following segments united; last segment broadly rounded at apex.

Length, 5 millimeters; width, 1.75.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single male collected at the type locality.

### Genus **ZEARGYRODES** novum

Form of *Zeargyra*. Head retractile, broad transverse, moderately convex in front, not wider than pronotum, and flat between the antennal tubercles, which are short and widely separated. Eyes nearly divided, widely separated on the top, the lower lobes as wide as long. Antennæ robust, 11-jointed, about as long as body, clothed with long moderately stiff hairs; scape rather long, not cicatricose at apex, subclavate, feebly arcuate, and not extending to base of pronotum; third joint about half as long as first, the following joints gradually diminishing in length. Pronotum nearly quadrate, subcylindrical, unarmed at sides and on disk, and without transverse grooves. Elytra moderately elongate, unarmed at base, flattened on basal half, strongly convex posteriorly, and clothed with erect stiff hairs. Legs moderately long; femora moderately clavate and unarmed at tips; tibiæ nearly straight, the middle pair emarginate on outer margin near apex; tarsi short, narrow, fourth joint about equal in length to joints 1 to 3 united; tarsal claws divergent.

Genotype, *Zeargyrodes fasciatus* sp. nov.

This genus belongs to the tribe Niphonini, and is closely allied to *Zeargyra* Pascoe and *Egesina* Pascoe. From the former it differs by the absence of the tubercles on pronotum and base of elytra, and by the eyes not being entirely divided; from *Egesina* it can be separated by the pronotum not being constricted at base, and the lower lobe of the eyes not longer than wide.

**Zeargyrodes fasciatus** sp. nov.

*Female.*—Moderately robust, shining black, elytra with apical half and a broad transverse fascia at basal third clothed with short cinereous pubescence; beneath brownish black.

Head densely, coarsely, and deeply punctate, rather densely clothed with very short cinereous pubescence, and with numerous long stiff erect black hairs intermixed; mandibles and palpi reddish brown. Antennæ uniformly black, densely finely punctate, sparsely clothed with short recumbent whitish pubescence, and densely clothed with short stiff erect hairs and longer flying hairs intermixed. Pronotum nearly quadrate, slightly narrower at base than apex, strongly convex and obsoletely gibbose on disk at middle, sides feebly arcuately rounded; anterior margin slightly arcuately rounded; base transversely truncate; surface densely, coarsely, and deeply punctate, sparsely obsoletely clothed with short recumbent cinereous pubescence, with a few long erect black hairs intermixed. Scutellum broadly rounded behind. Elytra much wider than pronotum at base; humeral angles prominent and broadly rounded; sides parallel to middle, feebly expanded and arcuately rounded behind middle, then arcuately attenuate to tips, which are conjointly broadly rounded; surface with rows of coarse punctures on basal half, becoming obsolete behind the middle, sparsely clothed with very fine obsolete blackish hairs, with numerous long stiff erect hairs intermixed, each elytron with apical half and a broad transverse fascia (which is broader at suture than lateral margin) rather densely clothed with very short recumbent cinereous pubescence; along anterior margin of the transverse fascia is a narrow row of longer and denser cinereous hairs, in front of which is a similar sinuate arcuate row extending from near suture to lateral margin, with the apex toward humerus, and a similar strongly sinuate transverse line in the dark median area, extending from lateral margin to middle of disk. Beneath finely densely punctate, and densely clothed with very fine cinereous pubescence, the hairs becoming longer and more conspicuous along posterior margin of first segment; last segment feebly depressed near apex and the surface with an obsolete longitudinal median line; middle and posterior tibiæ feebly curved outward at apex.

Length, 4.5 millimeters; width, 1.6.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a unique female collected at the type locality. In form and color this species resembles *Zeargyra vidua* Pascoe very closely, but can be easily separated from that species by the generic characters.

**Ebaeides borneensis sp. nov.**

*Male.*—Head reddish brown; pronotum and elytra light chestnut brown, the former slightly paler along base and anterior margin, and the upper surface of elytra irregularly marked with cinereous pubescence; beneath brownish black, becoming more or less luteous in many parts.

Head deeply concave between the antennal tubercles, the surface sparsely punctate, rather densely clothed with moderately long recumbent yellowish white pubescence, and with numerous stiff erect black hairs intermixed; mandibles reddish brown, the margins blackish; palpi yellowish brown. Antennæ 10-jointed, reddish brown, the narrow apical joints and base of swollen joints paler, the surface coarsely punctate, rugose, and densely clothed on all sides with short stiff bristling hairs and longer flying hairs intermixed; scape scarcely arcuate; third, fourth, and fifth joints very much swollen. (Joints 8 to 10 missing.) Pronotum one and one-fourth times as wide as long, base and apex about equal in width; sides feebly arcuate and feebly constricted near posterior and anterior angles; surface rather deeply, broadly, transversely grooved near base and anterior margins, finely obsoletely punctate and rather densely clothed with long recumbent yellowish brown pubescence, and with a longitudinal vitta of whitish pubescence on each side. Scutellum rounded behind. Elytra much wider than pronotum at base, with distinct rows of rather coarse, irregularly placed punctures, the surface rather densely clothed with very short recumbent brown pubescence, and ornamented with coarser and longer cinereous pubescence, irregularly placed over the basal two-thirds and extending narrowly along suture to apical fourth, where it forms a transverse arcuate fascia which does not extend to the lateral margins; there are also numerous short erect stiff black hairs, which are more distinct toward sides. Beneath finely densely punctate, and rather densely clothed with very fine cinereous hairs; anterior tibiæ strongly arcuate on inner margin, the middle and posterior pairs slightly curved outward.

Length, 4.5 millimeters; width, 1.6.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from one male received from C. F. Baker. This species is very closely allied to *E. monstrosa* Pascoe, which is the genotype, and *E. fulva* sp. nov., but differs from both of these species in having the pronotum as wide at base as at apex, and a distinct longitudinal cinereous pubescent vitta on each side of pronotum.

### Ebaeides fulva sp. nov.

*Female.*—Head reddish brown; pronotum chestnut brown, with the base and anterior margin slightly paler; elytra luteous, with obsolete brownish markings on disk, and irregularly marked with cinereous pubescence; beneath yellowish brown, becoming luteous in some areas.

Head moderately concave between the antennal tubercles, the surface sparsely finely punctate, sparsely clothed with obsolete yellowish pubescence, and with a few stiff erect black hairs intermixed; mandibles reddish brown, the margins blackish; palpi luteous. Antennæ 10-jointed, reddish to brownish black, base of joints paler, the surface densely coarsely punctate, and rather densely clothed on all sides with short stiff bristling hairs and longer flying hairs intermixed; scape smoother and slightly arcuate; third, fourth, and fifth joints moderately swollen. Pronotum one and one-third times as wide as long and slightly narrower at base than apex; sides feebly arcuate at middle, feebly constricted near anterior angles, and parallel at base; surface broadly but not very deeply transversely grooved near base and anterior margin, obsoletely punctate, and rather sparsely clothed with obsolete brownish pubescence. Scutellum rounded behind. Elytra much wider than pronotum at base, with distinct rows of moderately coarse punctures, which are more irregularly placed toward apex, the surface sparsely clothed with very fine short brownish hairs and ornamented with coarser and longer cinereous pubescence which is more or less irregularly placed on basal third, extending narrowly along suture to apical fourth, and forming a narrow transverse zigzag fascia behind the middle and extending from suture to lateral margins, behind which is a short narrow oblique fascia on each elytron, forming a right angle at suture, with the apex toward base of elytra; there are also numerous short erect stiff black hairs, which are more distinct toward sides. Beneath sparsely finely punctate, and sparsely clothed with a few short whitish hairs; anterior tibiæ strongly arcuate on inner margin, the middle and posterior pairs nearly straight, at most only feebly curved outward at apex.

Length, 3.5 millimeters; width, 1.25.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female received from C. F. Baker. This species is also closely allied to *E. monstrosa* Pascoe and *E. borneensis* sp. nov. From the latter it differs in having the pronotum narrower at base than at apex, without longitudinal cinereous pubescent vittæ on pronotum, the markings on the elytra differently arranged, and also in being smaller. From *monstrosa* it differs in having the transverse pubescent fascia behind middle of elytra zigzag and not arcuate, and by the absence of the transverse grayish pubescence on pronotum.

**Ebaeides basalis** sp. nov.

*Female.*—Black; pronotum with the anterior and posterior margins reddish yellow; elytra with the basal regions reddish yellow and the surface more or less ornamented with cinereous pubescence; beneath brownish black and more or less reddish yellow on the median parts.

Head broadly feebly concave between the antennal tubercles, the surface sparsely obsoletely punctate, not very densely clothed with moderately long cinereous pubescence, and with a few stiff erect black hairs intermixed; mandibles black; palpi yellowish brown. Antennæ 11-jointed, uniformly black, the surface densely coarsely punctate, rugose, and densely clothed on all sides with short stiff erect hairs and longer flying hairs intermixed; scape scarcely arcuate; third, fourth, and fifth joints strongly swollen. Pronotum slightly wider than long, base and apex about equal in width; sides slightly arcuate at middle and feebly constricted near anterior and posterior angles; surface rather deeply transversely grooved near base and anterior margin, densely obsoletely punctate, and rather densely clothed with moderately long inconspicuous pubescence, forming a more or less distinct longitudinal median line, and with a more conspicuous spot of cinereous hairs on each side toward the lateral margins. Scutellum broadly rounded behind. Elytra much wider than pronotum at base, with rows of coarse, rather closely and irregularly placed punctures, the punctures becoming more obsolete toward apex, the surface sparsely clothed with fine short brownish black pubescence, and ornamented with coarser and longer cinereous hairs, forming obsolete narrow longitudinal broken rows along suture, lateral margins, and at apex, and on each elytron a longitudinal arcuate vitta extending from humerus to near the middle, with the concavity toward the lateral margin, a similar one extending from inner side of scutellum to suture at basal third, with the concavity toward suture, and with a small irregularly shaped spot on disk near apical third; there are also numerous short stiff erect black hairs over the surface, which are more conspicuous toward the sides. Beneath finely densely punctate, and rather densely clothed with moderately long cinereous hairs, with a few longer ones intermixed; anterior tibiæ strongly arcuate on the inner side, the middle and posterior pairs feebly curved outward.

Length, 4.5 millimeters; width, 1.5.

*Type locality.*—Cuernos Mountains, Negros, Philippines.

Type in United States National Museum.

Described from one female collected at the type locality (*Baker 21717*).

**Ebaeides pilosicornis** sp. nov.

*Male.*—Head piceous; pronotum and elytra dark brown, the former with the anterior and posterior margins luteous, the elytra more or less marked with luteous, especially on the basal region, and irregularly ornamented with cinereous pubescence; beneath brown, the median parts, tibiæ, and tarsi more or less luteous.

Head deeply and broadly concave between the antennal tubercles; the surface sparsely obsoletely punctate, densely clothed with rather long whitish pubescence, and with a few stiff erect black hairs intermixed; mandibles reddish brown, margins black; palpi luteous. Antennæ 11-jointed, reddish black, base of joints more reddish, the surface coarsely densely punctate, somewhat rugose, and rather densely clothed on all sides with short stiff bristling hairs and longer flying hairs intermixed; scape feebly arcuate; third, fourth, and fifth joints moderately swollen. Pronotum as long as wide, slightly narrower at base than apex; sides slightly arcuate at middle and feebly constricted near anterior and posterior angles; surface broadly and rather deeply transversely grooved near base and anterior margin, finely obsoletely punctate, and rather densely clothed with moderately long recumbent brownish or yellowish white pubescence. Scutellum broadly rounded behind. Elytra much wider than pronotum at base, with rows of coarse, irregularly placed punctures, the surface sparsely clothed with very fine short brownish pubescence, and ornamented with coarser and longer cinereous hairs, which are more or less irregularly placed, forming on each elytron a longitudinal arcuate vitta extending from humerus backward to near middle, with the concavity toward the lateral margin, a similar one extending from inner side of scutellum to basal third, with the concavity toward suture, then forming a semicircular spot along suture at middle, a small irregularly shaped transverse spot at apical third, placed closer to suture than lateral margin, and with numerous obsolete rows of cinereous hairs on apical half; there are also numerous short erect black hairs over the surface, which are more distinct toward the sides. Beneath rather densely obsoletely punctate, and rather densely clothed with moderately long cinereous hairs, especially on the legs; anterior tibiæ strongly arcuate on inner side, the middle and posterior pairs slightly curved outward.

Length, 4.5 millimeters; width, 1.6.

*Type locality.*—Sibuyan Island, Philippines.

Type in United States National Museum.

Described from one male collected at the type locality. This species is closely allied to *E. palliata* and *E. viduata*, both described by Pascoe from Borneo. From both these species it differs in having joints 5 to 11 of the antennæ paler at base, and from *palliata* also by the pronotum being deeply transversely grooved near base and anterior margin.

**Ebaeides albopicta** sp. nov.

*Female.*—Brownish black, the basal regions of the elytra reddish, and ornamented with cinereous pubescence; beneath brownish black, with the median parts reddish yellow.

Head broadly but not very deeply concave between the antennal tubercles, the surface sparsely obsoletely punctate, sparsely clothed with moderately long cinereous pubescence, and with a few stiff erect black hairs intermixed; mandibles reddish brown, becoming black at tips; palpi yellowish brown. Antennæ 11-jointed (eleventh joint missing), uniformly black, the surface coarsely densely punctate, rugose, and densely clothed on all sides with short stiff erect hairs and longer flying hairs intermixed; scape feebly arcuate; third, fourth, and fifth joints moderately swollen. Pronotum slightly wider than long, base and apex about equal in width; sides slightly arcuate at middle and feebly constricted near anterior and posterior angles; surface rather deeply transversely grooved near base and anterior margin, finely densely punctate, and rather densely clothed with fine brownish pubescence and ornamented with a few more or less distinct spots of cinereous hairs. Scutellum broadly rounded behind. Elytra much wider than pronotum at base, with rows of coarse, irregularly placed punctures, the punctures becoming more obsolete toward apex, the surface sparsely clothed with fine short brownish black pubescence and ornamented with coarser and longer cinereous hairs, forming narrow longitudinal broken rows, and on each elytron a broad elongate obsolete spot at base, a smaller one on disk in front of middle, and a more irregular spot behind middle; there are also numerous long stiff erect black hairs over the surface, which are more conspicuous toward sides. Beneath finely, densely punctate, and rather densely clothed with fine, moderately long cinereous hairs and with a few longer erect ones intermixed, especially on the legs; anterior tibiæ feebly arcuate on inner side, the middle and posterior pairs nearly straight.

Length, 4 millimeters; width, 1.5.

*Type locality.*—Basilan Island, Philippines.

Type in United States National Museum.

Described from a unique female collected at the type locality.

**Ebaeides hirsuta** sp. nov.

*Female.*—Black, the basal regions of elytra slightly reddish, and ornamented with yellowish white pubescence; beneath black, with a feeble reddish tinge on the median parts.

Head deeply and broadly concave between the antennal tubercles, the surface sparsely, obsoletely punctate, densely clothed with long recumbent yellowish white pubescence, and with numerous stiff erect black hairs intermixed; mandibles black; palpi reddish brown. Antennæ 11-jointed, uniformly black, the surface densely coarsely punctate, rugose, and rather densely clothed on all sides with short stiff erect hairs and longer flying hairs intermixed; scape arcuate; third, fourth, and fifth joints strongly swollen. Pronotum one and three-tenths times as wide as long, base and apex nearly equal in width; sides slightly arcuate at middle and feebly constricted near anterior and posterior angles; surface rather deeply transversely grooved near base and anterior margin, finely densely punctate, sparsely clothed with fine, inconspicuous pubescence, forming a more distinct longitudinal median line, and with two spots of more conspicuous yellowish hairs on each side toward lateral margins. Scutellum broadly rounded behind. Elytra much wider than pronotum at base, with rows of coarse, irregularly placed punctures, the punctures becoming more obsolete toward apex, the surface sparsely clothed with fine short brownish black pubescence and ornamented with coarser and longer yellowish white hairs, forming narrow longitudinal broken rows, and on each elytron a more distinct vitta, extending arcuately from inner side of scutellum to suture at basal fourth, a small spot on middle of disk at basal third, and a larger, more irregularly shaped spot just behind middle; there are also numerous long stiff erect black hairs over the surface, which are more conspicuous toward sides. Beneath finely densely punctate, and densely clothed with very fine, moderately long cinereous hairs and with a few longer erect ones intermixed; anterior tibiæ strongly arcuate on inner side, the middle and posterior pairs feebly curved outward.

Length, 5.5 millimeters; width, 1.9.

*Type locality.*—Iligan, Mindanao, Philippines.

Type in United States National Museum.

Described from one female collected at the type locality (*Baker 21714*). This species is very closely related to *E. basalis* sp. nov. and *E. albopicta* sp. nov., and all are probably only geographical races of one old species, which have been separated for a great length of time and developed into distinct types or species. More material is necessary for the study of these closely allied forms.

**Ebaeides montana** sp. nov.

*Male.*—Above black, the elytra ornamented with narrow longitudinal rows of cinereous pubescence and sometimes reddish at base; beneath black, becoming somewhat reddish on sternum and tibiæ.

Head rather deeply concave between the antennal tubercles, the surface sparsely punctate, rather densely clothed with moderately long cinereous pubescence, and with numerous stiff erect black hairs intermixed; mandibles reddish brown, the margins black; palpi luteous. Antennæ 10-jointed, black, sometimes the joints paler at base, the surface densely coarsely punctate, rugose, and densely clothed on all sides with short stiff bristling hairs and longer flying hairs intermixed; scape slightly arcuate; third, fourth, and fifth joints moderately swollen. Pronotum nearly as long as wide, base and apex about equal in width; sides feebly arcuate at middle, and not distinctly constricted near posterior and anterior angles; surface feebly broadly transversely grooved near base and anterior margin, finely sparsely punctate, and sparsely clothed with obsolete recumbent brownish pubescence. Scutellum rounded behind. Elytra much wider than pronotum at base, with distinct rows of coarse, densely and irregularly placed punctures, sparsely clothed with short obsolete brownish pubescence and numerous short erect stiff black hairs intermixed, and each elytron with about ten narrow longitudinal rows of cinereous hairs, which become more or less confused toward apex. Beneath finely and densely punctate except on the median parts, rather densely clothed with short recumbent cinereous pubescence, especially on the legs, and with a few obsolete erect hairs intermixed; femora strongly swollen; anterior tibiæ strongly arcuate on inner side, the middle and posterior pairs slightly curved outward.

*Female.*—Similar to the male, differing from it only in the secondary sexual characters, such as the last abdominal segment with a concave depression near apex, and the absence of the depressed oblong spot on the femora.

Length, 4.25 to 4.75 millimeters; width, 1.4 to 1.7.

*Type locality.*—Cuernos Mountains, Negros, Philippines.

Type, allotype, and paratype in United States National Museum; paratypes in the collection of C. F. Baker.

This species was described from five specimens, three males and two females, all collected at the type locality. It can be separated easily from all the other known species having a 10-jointed antenna by the distinct narrow, longitudinal rows of cinereous pubescence on the elytra.

### **Ropica variegata sp. nov.**

*Female.*—Elongate, rather robust, and strongly convex; above chestnut brown, irregularly variegated with a luteous color; beneath yellowish brown.

Head nearly quadrate and feebly convex in front, not wider than pronotum, feebly concave between the antennal tubercles, which are short and widely separated; surface with a narrow longitudinal carina extending from occiput to near epistoma, rather densely coarsely punctate, and densely clothed with short recumbent yellowish pubescence; mandibles reddish brown, becoming black at tips; palpi luteous; eyes divided, the lower lobe small and rounded, the upper lobe narrow and widely separated on top. Antennæ slightly longer than body, uniformly luteous, and sparsely clothed with short recumbent brownish pubescence (hairs obsoletely yellowish white at apex of joints); first joint short, moderately robust, cylindrical, and shorter than third; third and fourth joints nearly subequal in length; the following joints gradually diminishing in length. Pronotum one and two-thirds times as wide as long, slightly narrower at base than apex, and widest at middle; sides unarmed and feebly arcuately rounded; anterior and posterior margins transversely truncate;

surface regularly convex, with a narrow groove along base and anterior margin, densely coarsely punctate, the punctures deeply impressed, distinctly separated and somewhat denser toward sides, densely clothed with short recumbent brownish and yellowish pubescence, the brownish hairs forming three obsolete longitudinal vittæ on disk. Scutellum broadly rounded behind. Elytra slightly wider than pronotum at base, the sides nearly parallel to apical third, where they are feebly arcuately expanded, then arcuately attenuate to the tips, which are separately obtusely angulated; surface obsoletely depressed on disk at basal third, densely, deeply, and irregularly punctate, the punctures coarser at base, but becoming finer and more widely separated toward apex, densely clothed with short recumbent brownish and yellowish white pubescence, the brown pubescence forming an obsolete spot behind scutellum, a transverse irregularly shaped broken fascia near middle, and becoming more variegated on the apical half. Beneath finely densely punctate and densely clothed with very fine recumbent cinereous pubescence; last abdominal segment subtruncate at apex, feebly depressed, and with a narrow longitudinal median groove; anterior and middle tibiæ nearly straight, the posterior pair feebly curved outward near apex.

Length, 4.25 millimeters; width, 1.75.

*Type locality.*—Basilan Island, Philippines.

Type in United States National Museum.

Described from one female collected at the type locality (*Baker 13512*). Under this species I have placed another specimen collected by Professor Baker at the same locality, which does not agree exactly with the type. It is a male and is more brownish black above, the pubescence on the elytra is more or less denuded, and the markings are not quite as distinct as in the type. It is best to place it under this species, at least for the present, until more material is available for study.

**Ropica robusta sp. nov.**

*Male.*—Elongate, rather robust, and strongly convex; above brownish black, each elytron ornamented with obsoletely paler areas as follows: A small spot at base near scutellum, a broad elongate spot in front of middle along suture, and the entire apical third; beneath brownish black, first abdominal segment reddish brown.

Head quadrate and feebly convex in front, not wider than pronotum, feebly concave between the antennal tubercles, which are short and widely separated; surface with a concave depression on vertex between eyes, an obsolete longitudinal carina on front, sparsely coarsely punctate, and rather densely clothed with short recumbent yellowish white pubescence; mandibles reddish brown, tips black; palpi brownish yellow; eyes small, divided, the lower lobe rounded, and the upper lobe narrow and widely separated on top. Antennæ slightly longer than body, uniformly brownish black, and sparsely clothed with short inconspicuous pubescence with a few cinereous hairs intermixed; first joint short, moderately robust, cylindrical, and shorter than third; third and fourth joints nearly subequal in length; the following joints gradually diminishing in length. Pronotum one and one-half times as wide as long, apex and base about equal in width and widest at middle; sides unarmed and feebly arcuately rounded; anterior and posterior margins transversely truncate; surface regularly convex, with a narrow groove along base and anterior margin, only visible at sides, densely coarsely punctate, the punctures irregularly placed and distinctly separated, and rather densely clothed with short recumbent yellowish white pubescence. Scutellum broadly rounded behind. Elytra distinctly wider than pronotum at base, the sides nearly parallel to apical third, where they are feebly arcuately expanded, then arcuately attenuated to the tips, which are separately obtusely rounded; surface convex, densely, coarsely, and irregularly punctate over entire surface, rather densely clothed with short inconspicuous pubescence, each elytron ornamented with coarser whitish pubescence as follows: A small spot at base near scutellum, a broad elongate spot along suture in front of middle, and more or less variegated at the side and on apical third. Beneath densely, finely punctate and densely clothed with fine recumbent cinereous pubescence; last abdominal segment broadly rounded at apex; anterior and middle tibiæ nearly straight, the posterior pair feebly curved outward near apex.

Length, 3.75 millimeters; width, 1.5.

*Type locality.*—Cuernos Mountains, Negros, Philippines.

Type in United States National Museum.

Described from a unique male collected at the type locality.

**Sybra scutellata** sp. nov.

*Male.*—Elongate, subcylindrical; head and pronotum chestnut brown, the latter with the anterior margin yellowish brown; elytra brownish yellow, with a large triangular brownish black spot covering scutellar region, a broken, irregularly shaped dark brown spot at suture near middle, and apical half more or less variegated with the same color; beneath dark brown, sternum and legs, except middle of femora, brownish yellow.

Head quadrate and feebly convex in front, not wider than pronotum, nearly flat between the antennal tubercles, which are very short and widely separated; surface very coarsely, sparsely punctate, and rather densely clothed with moderately long recumbent yellowish pubescence; mandibles reddish brown, the tips black; palpi brownish yellow; eyes rather large, coarsely granulated and deeply emarginate, the lower lobe rounded, and the upper lobes separated from each other on the top by about half the distance that separates the lower lobes on the front. Antennæ about as long as body, slender, uniformly brownish yellow, and sparsely clothed with short recumbent cinereous pubescence; first joint short, ovate, and slightly robust; third and fourth joints feebly arcuate, fourth slightly longer than third, the following joints gradually diminishing in length. Pronotum only obsoletely wider than long, apex and base about equal in width, and widest at middle; sides arcuately rounded; base transversely truncate; anterior margin arcuately rounded; surface regularly convex, with a broad shallow transverse depression along base, rather densely, coarsely punctate, and densely clothed with moderately long recumbent yellowish white pubescence. Scutellum broadly rounded behind. Elytra slightly wider than pronotum, the sides parallel to apical third, then arcuately attenuate to the tips, which are conjointly, deeply, rectangularly emarginate; surface with rows of coarse, rather closely placed punctures, which are somewhat confused in scutellar region and obsolete toward apex, and rather densely and irregularly clothed with moderately long recumbent yellowish white pubescence. Beneath finely densely punctate, and densely clothed with rather long recumbent yellowish pubescence; last abdominal segment broadly rounded at apex; tibiæ nearly straight, the middle pair strongly emarginate on outer margin near apex; prosternal process distinctly angulated on each side between the anterior coxæ.

Length, 3.5 millimeters; width, 1.2.

*Type locality.*—Basilan Island, Philippines.

Type in United States National Museum.

Described from a single male collected at the type locality.

**Sybra punctata** sp. nov.

*Male.*—Elongate and subcylindrical; above uniformly brownish black and rather shining; beneath dark brown, with a distinct reddish tinge, especially on the legs.

Head subquadrate and feebly convex in front, not wider than pronotum, feebly concave between the antennal tubercles, which are short and widely separated; surface coarsely sparsely punctate, and densely clothed with moderately long, recumbent, cinereous pubescence; mandibles reddish brown, the tips black; palpi luteous; eyes small and very deeply emarginate, the lower lobes rounded, the upper lobes close together on the top and separated from each other by about one-fourth the distance that separates the lower lobes on the front. Antennæ about as long as body, slender, uniformly reddish brown, and sparsely clothed with short recumbent cinereous pubescence, the hairs denser at base of joints; first joint short, ovate, and slightly robust; third and fourth joints feebly arcuate, fourth slightly longer than third; the following joints gradually diminishing in length. Pronotum as long as wide, apex and base equal in width, and widest at middle; sides arcuately rounded; base transversely truncate; anterior margin arcuately rounded; surface regularly convex, densely and very coarsely punctate, and sparsely clothed with short recumbent cinereous pubescence. Scutellum broadly rounded behind. Elytra slightly wider than pronotum, the sides parallel to apical third, then arcuately attenuate to the tips, which are conjointly arcuately emarginate, with the apex of each elytron obsoletely expanded; surface with rows of coarse, deep punctures, which are nearly confluent on basal region but become finer toward apex, and rather densely clothed with short recumbent cinereous pubescence, arranged in more or less distinct longitudinal rows between the rows of punctures. Beneath obsoletely punctate and sparsely clothed with moderately long cinereous pubescence; last abdominal segment broadly rounded at apex; tibiæ nearly straight, the middle pair strongly emarginate on outer margin near apex; prosternal process parallel between the anterior coxæ.

Length, 3 millimeters; width, 1.

*Type locality.*—Basilan Island, Philippines.

Type in United States National Museum.

Described from a single male collected at the type locality.

**Mynonebra opaca** sp. nov.

Above dark reddish brown, opaque, the elytra ornamented with cinereous pubescence; beneath dark reddish brown, base of femora, tibiæ, and tarsi slightly paler.

Head strongly transverse and feebly convex in front, slightly wider than pronotum at apex, and broadly concave between the antennal tubercles, which are rather strongly developed and widely separated; surface finely and very densely granulose and sparsely clothed with moderately long recumbent pubescence; mandibles black and slightly reddish toward base; palpi dark brown, the tips paler; eyes rather large and deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes narrow and separated from each other on the top by about one-third the distance that separates the lower lobes on the front. Antennæ one and one-half times as long as body, slender, yellowish brown, sparsely clothed with inconspicuous pubescence, and with a few longer black hairs on underside of joints; first joint extending to about middle of pronotum, rather robust, and cylindrical; third joint subequal in length to first joint and slightly shorter than fourth; fifth, sixth, and seventh joints subequal in length to third, the following joints gradually diminishing in length. Pronotum quadrate, the base only feebly narrower than apex; sides feebly arcuate to basal fourth, then parallel to posterior angles, and with a rather short broad tooth placed slightly behind middle; surface feebly convex, without transverse depressions, very densely, finely granulose, and sparsely clothed with short recumbent cinereous pubescence, which forms three more or less distinct longitudinal vittæ on disk. Scutellum large, triangular, and broadly truncate posteriorly. Elytra distinctly wider than pronotum, moderately convex, with a broad oblique depression extending from humeri to suture, and narrowly flattened along suture; sides nearly parallel to apical third, then obliquely narrowed to tips, which are separately narrowly rounded; surface coarsely irregularly punctate, the punctures rather densely placed on basal region, but becoming obsolete toward apex, sparsely clothed with very short inconspicuous brown pubescence, and more or less marbled with longer cinereous pubescence, which is more distinct in the oblique anterior depression, forming a narrow transverse arcuate fascia at apical third. Beneath finely densely punctate and rather densely clothed with moderately long recumbent cinereous pubescence; last abdominal segment with a very deep semicircular depression at apex.

Length, 5.5 millimeters; width, 1.7.

*Type locality.*—Cuernos Mountains, Negros, Philippines.

Type in United States National Museum.

Described from a single example, probably a female, collected at the type locality.

**Exocentrus subglaber sp. nov.**

*Female.*—Head and pronotum black, the latter with the anterior and posterior margins reddish brown; elytra brownish yellow, with the sutural region broadly reddish black, and only clothed with stiff erect hairs; beneath brownish black, with the tibiæ and tarsi feebly reddish.

Head strongly transverse and nearly flat in front, as wide as pronotum at apex, and feebly concave between the antennal tubercles, which are rather short and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, rather densely, finely granulose, the granules distinctly separated, very sparsely clothed with moderately long recumbent cinereous pubescence and with numerous long erect black hairs intermixed; mandibles black; palpi brownish black, the tips yellowish; eyes large and very deeply emarginate, the lower lobes quadrate and strongly convex, the upper lobes rather narrow and separated from each other on the top by about half the distance that separates the lower lobes on the front. Antennæ slightly longer than body, rather slender, uniformly dark brown, sparsely clothed with short inconspicuous pubescence, and with numerous long erect stiff black hairs intermixed; first joint extending to middle of pronotum, rather robust, and cylindrical; third joint about three-fourths as long as first joint and subequal in length to fourth, the following joints gradually diminishing in length. Pronotum twice as wide as long, distinctly narrower at base than apex; sides feebly arcuately rounded from anterior margin to a broad tooth placed slightly behind the middle, then strongly obliquely attenuate to base, the tooth long, acute at apex, and bent backward nearly in a line with elytra; surface feebly convex, with a narrow groove along anterior and posterior margins, densely granulose similar to that on head, very sparsely clothed with long recumbent cinereous pubescence, and with a few long erect stiff black hairs along the margins. Scutellum broadly rounded behind and densely clothed with recumbent cinereous pubescence. Elytra slightly wider than pronotum at middle, moderately convex, the sides nearly parallel to behind middle, where they are feebly arcuately expanded, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface with rows of coarse, closely placed punctures, the punctures forming a more or less confused double row for a short distance behind scutellum, also confused along lateral margins, and becoming obsolete toward apex, the surface glabrous, and only armed with numerous long erect stiff black hairs. Beneath finely densely punctate, sparsely clothed with rather short recumbent cinereous pubescence, and the legs with a few long erect stiff black hairs; last abdominal segment broadly triangularly emarginate at apex, transversely, narrowly, and deeply grooved along apical margin, and with a broad triangular depression in front of groove.

Length, 4.5 millimeters; width, 1.8.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality.

**Exocentrus mindanaoensis** sp. nov.

*Female.*—Head black, slightly reddish along anterior margin; pronotum and elytra reddish brown, the former slightly paler along anterior and posterior margins, elytra paler at apex and rather densely, irregularly ornamented with cinereous pubescence, with an obsolete brown area on each elytron behind middle; beneath reddish brown, with the femora slightly darker.

Head strongly transverse and nearly flat in front, slightly wider than pronotum at apex, nearly flat between the antennal tubercles, which are short and widely separated; surface with an obsolete longitudinal carina, rather densely finely granulose, the granules distinctly separated, rather densely clothed with moderately long recumbent yellowish white pubescence, with a few long erect black hairs intermixed; mandibles black, slightly reddish at base; palpi reddish brown, the tips paler; eyes very large and deeply emarginate, the lower lobes quadrate and strongly convex, the upper lobes small and separated from each other on the top by half the distance that separates the lower lobes on the front. Antennæ slightly longer than body (last joint missing), slender, reddish brown, the joints slightly paler at base, sparsely clothed with short recumbent cinereous pubescence and with numerous long erect black hairs intermixed; first joint extending to middle of pronotum, rather robust, and subcylindrical; third joint three-fourths as long as first joint and slightly shorter than fourth. Pronotum twice as wide as long, and slightly narrower at base than apex; sides arcuately expanded from apical angles to a moderately broad tooth placed slightly behind middle, then strongly obliquely narrowed to base, the tooth rather long, acute at apex, and bent backward nearly in a line with elytra; surface feebly convex, with a narrow obsolete transverse groove along anterior and posterior margins, densely finely punctate, with a few larger punctures intermixed, from which arises a long erect stiff black hair, and densely clothed with long recumbent yellowish white pubescence. Scutellum broadly rounded behind. Elytra slightly wider than pronotum at middle and moderately convex; sides feebly expanded at middle, arcuately attenuate posteriorly to the tips, which are separately narrowly rounded; surface with rows of coarse, closely placed punctures, the rows not extending to apex, between which are rows of rather regularly placed coarser black elevated punctures, from each of which arises a long erect stiff black hair, sparsely clothed with short brown recumbent pubescence, and ornamented with cinereous pubescence, as noted above. Beneath densely obsoletely punctate, rather densely clothed with moderately long recumbent cinereous pubescence, with numerous small round glabrous spots, and with a number of long erect black hairs intermixed; last abdominal segment triangularly emarginate at apex, narrowly grooved along apical margin, obsoletely depressed in front of groove, and with a narrow longitudinal median carina.

*Male.*—Similar to female, but smaller and slenderer, antennæ slightly longer, the tooth on side of pronotum bent backward more on a line with elytra, and the last abdominal segment subtruncate at apex.

Length, 4.25 to 5.75 millimeters; width, 1.75 to 2.5.

*Type locality.*—Davao, Mindanao.

*Other localities.*—Iligan and Zamboanga, Mindanao, Philippines.

Type, allotype, and paratype in United States National Museum; paratype in the collection of C. F. Baker.

Described from four specimens, the type and one female paratype from Davao, allotype from Iligan (*Baker 21710*), and one female paratype from Zamboanga (*Baker 13495*). The specimen from Zamboanga is paler than the type, the pubescence on elytra more evenly distributed, the small glabrous spots on abdomen are obsolete, and the last abdominal segment is more truncate at apex.

### **Exocentrus alboguttatus** sp. nov.

*Male.*—Head black; pronotum and elytra dark brown, the former slightly reddish along the anterior and posterior margins, and the elytra with longitudinal rows of small elongate cinereous pubescent spots, these spots more confluent at the middle, forming a distinct narrow transverse fascia; beneath brownish black, becoming more reddish on the legs.

Head strongly transverse and feebly convex in front, slightly wider than pronotum at apex, slightly concave between the antennal tubercles, which are short and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, and more deeply impressed between the antennæ, densely finely granulose, the granules more or less confluent, and nearly concealed by a rather long recumbent cinereous pubescence, with a few long erect black hairs intermixed; mandibles reddish brown, the margins and tips black; palpi brownish black, the tips paler; eyes very large and deeply emarginate, the lower lobes quadrate and strongly convex, the upper lobes small and separated from each other on the top by one-third the distance that separates the lower lobes on the front. Antennæ about one and one-fourth times as long as body, slender, uniformly dark brown, densely clothed with short recumbent brown pubescence, and base of joints annulated with cinereous hairs and with numerous long erect black hairs intermixed; first joint extending beyond middle of pronotum, robust, and cylindrical; third joint about equal in length to first joint, and distinctly longer than fourth. Pronotum not quite twice as wide as long, and distinctly narrower at base than apex; sides nearly parallel from apical angles to a slender tooth placed slightly behind middle, then strongly arcuately emarginate to base, the tooth rather long, slender, acute at apex, and bent obliquely backward; surface feebly convex, with a narrow obsolete transverse groove on each side along base, densely finely granulose, the granules nearly concealed by the long recumbent cinereous pubescence, and with a few long erect black hairs intermixed. Scutellum broadly rounded behind. Elytra distinctly wider than pronotum at middle and moderately convex; sides nearly parallel to apical third, then arcuately rounded to the tips, which are separately narrowly rounded; surface coarsely densely punctate, the punctures more or less arranged in rows at middle of disk and becoming obsolete toward apex, sparsely clothed with short brown recumbent pubescence, with numerous long erect black hairs intermixed, and ornamented with cinereous pubescent spots as noted above. Beneath finely densely punctate, rather densely clothed with moderately long recumbent cinereous pubescence, and with numerous long erect black hairs on the legs; last abdominal segment broadly rounded at apex.

*Female.*—Similar to male, but larger and more robust, pronotum not quite as densely pubescent, and the last abdominal segment truncate at apex, with a deep narrow triangular depression along apical margin, and a narrow longitudinal median carina.

Length, 6.5 to 8 millimeters; width, 2.5 to 3.25.

*Type locality.*—Davao, Mindanao, Philippines.

*Other localities.*—Los Baños, Luzon, and Sibuyan Island, Philippines.

Type, allotype, and paratype in United States National Museum; paratypes in the collection of C. F. Baker.

Described from six specimens, the type, allotype, and one male and female paratypes from Davao (*Baker 13493*), one female paratype from Sibuyan Island, and a male paratype from Los Baños.

This species is closely allied to *E. lachrymosus* Pascoe, described from Sarawak, but has the head and pronotum densely pubescent, while in *lachrymosus*, according to the description, the head has only a few scattered hairs in front, and the pronotum a very thin pubescence, principally at the sides.

**Exocentrus badius** sp. nov.

*Female.*—Head brownish black, strongly reddish in front; pronotum and elytra reddish brown, the latter rather densely ornamented with more or less rounded cinereous pubescent spots, except for a large round brown space on each elytron just behind the middle; beneath reddish brown, with a strong yellowish tinge on abdomen.

Head strongly transverse and nearly flat in front, slightly wider than pronotum at apex, and flat between the antennal tubercles, which are short and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, rather densely, finely granulose, the granules distinctly separated, sparsely clothed with long semierect cinereous pubescence, and with a few long erect black hairs intermixed; mandibles black; palpi dark brown, the tips paler; eyes very large and deeply emarginate, the lower lobes quadrate and strongly convex, the upper lobes small and separated from each other on the top by one-third the distance that separates the lower lobes on the front. Antennæ slightly longer than body (last three joints missing), slender, dark reddish brown, rather densely clothed with short recumbent cinereous pubescence, and with numerous long erect black hairs intermixed; first joint extending slightly beyond middle of pronotum, rather robust, and subfusiform; third joint three-fourths as long as first joint, and subequal in length to fourth. Pronotum nearly one and three-fourths times as wide as long, distinctly narrower at base than apex; sides feebly obliquely expanded from apical angles to a slender tooth placed slightly behind middle, then strongly obliquely narrowed to base, the tooth long, slender, acute at apex, and bent obliquely backward; surface feebly convex, with a broad obsolete transverse depression along base, densely finely granulose, the granules confluent on some parts, rather densely clothed with long, more or less recumbent cinereous pubescence, and with a few long erect stiff black hairs intermixed. Scutellum broadly rounded behind and densely pubescent. Elytra distinctly wider than pronotum at middle and moderately convex; sides nearly parallel to apical third, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface coarsely, densely, and irregularly punctate, the punctures becoming obsolete toward apex, sparsely clothed with fine brown recumbent pubescence and ornamented with numerous more or less rounded cinereous pubescent spots, except for a large round brown space on each elytron just behind middle. Beneath finely, densely punctate, densely clothed with moderately long recumbent cinereous pubescence and with a few long erect black hairs on the legs; last abdominal segment truncate at apex, with a slight emargination at middle, transversely narrowly grooved along apical margin, and with a narrow longitudinal median carina, but without a distinct depression in front of groove.

Length, 5 millimeters; width, 2.

*Type locality.*—Davao, Mindanao, Philippines.

Type in United States National Museum.

Described from a single female collected at the type locality (*Baker 13494*).

**Exocentrus albovarius** sp. nov.

*Female.*—Head black, slightly reddish behind epistoma; pronotum and elytra dark brown, the latter densely ornamented with more or less rounded cinerous pubescent spots, and with an irregularly shaped brown space on each elytron just behind middle; beneath reddish brown, with the abdomen slightly yellowish on the median parts.

Head strongly transverse and nearly flat in front, about as wide as pronotum at apex, and feebly concave between the antennal tubercles, which are widely separated; surface with a rather broad shallow longitudinal groove extending from occiput to epistoma, nearly smooth, rather densely clothed with long semierect cinereous pubescence, and with numerous long erect black hairs intermixed; mandibles black, slightly reddish at base; palpi black, the tips yellowish; eyes moderately large and very deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes smaller and separated from each other on the top by half the distance that separates the lower lobes on the front. Antennæ about as long as body (last two joints missing), slender, uniformly dark brown, rather densely clothed with short recumbent cinereous pubescence, and with numerous long erect black hairs intermixed; first joint extending slightly beyond middle of pronotum, rather robust, and nearly cylindrical; third joint three-fourths as long as first joint and subequal in length to fourth. Pronotum twice as wide as long and distinctly narrower at base than apex; sides nearly parallel from apical angles to a broad tooth placed near base, then nearly transversely narrowed to base, the tooth rather short, acute at apex, and bent backward nearly in a line with elytra; surface feebly convex, with an obsolete transverse depression along base, densely obsoletely granulose, densely clothed with long semierect cinereous pubescence (obscuring most of the granules), and with a few long erect black hairs intermixed. Scutellum broadly rounded behind and densely pubescent. Elytra distinctly wider than pronotum at middle and moderately convex; sides nearly parallel to behind middle where they are feebly arcuately expanded, then arcuately attenuate to the tips, which are separately narrowly rounded; surface coarsely and rather densely punctate, the punctures more or less arranged in rows on middle of disk, and extending nearly to apex, sparsely clothed with fine brown pubescence and ornamented with numerous, more or less rounded, cinereous pubescent spots, with an irregularly shaped brown space on each elytron behind middle, and with numerous long erect black hairs intermixed. Beneath finely densely punctate, and densely clothed with moderately long recumbent cinereous pubescence, with numerous long erect hairs intermixed; last abdominal segment truncate at apex, with a slight emargination at middle, transversely narrowly grooved along apical margin, and with a narrow longitudinal median carina, but without a distinct depression in front of the groove.

*Male.*—Similar to female, but smaller and slenderer, antennæ slightly longer, elytra not much wider than pronotum at middle, and the markings more confluent, abdomen beneath not as densely pubescent, and last abdominal segment broadly rounded at apex.

Length, 3.5 to 5 millimeters; width, 1.4 to 2.

*Type locality.*—Davao, Mindanao, Philippines.

Type and allotype in United States National Museum; paratype in collection of C. F. Baker.

Described from three specimens, two females and one male, all collected at the type locality (*Baker 13496*).

This species is very closely allied to *E. badius* sp. nov., but the coloration is a darker brown; head not granulose; eyes are more widely separated from each other on the top; pronotum is wider; the tooth is broad, situated close to base, and bent backward on a line with elytra; and the brown space on each elytron behind the middle is irregular in shape.

**Exocentrus hirtus** sp. nov.

*Male.*—Above light brown, with the pronotum tinged with yellow, the elytra ornamented with elongate yellowish white pubescent spots arranged in longitudinal rows, and with a more or less distinct brown spot on each elytron just behind the middle; beneath reddish brown, the legs slightly darker.

Head strongly transverse and nearly flat in front, distinctly wider than pronotum at apex, slightly concave between the antennal tubercles, which are rather short and widely separated; surface with a narrow longitudinal groove extending from occiput to vertex, and rather deeply impressed between the antennæ, rather densely, finely granulose, the granules distinctly separated, sparsely clothed with moderately long recumbent yellowish white pubescence, and with a few long erect black hairs intermixed; mandibles reddish brown, the tips black; palpi brownish yellow; eyes very large and deeply emarginate, the lower lobes quadrate and strongly convex, the upper lobes small and separated from each other on the top by about one-fourth the distance that separates the lower lobes on the front. Antennæ nearly one and one-half times as long as body, slender, reddish brown, base of joints slightly paler, sparsely clothed with inconspicuous pubescence and with numerous long erect black hairs intermixed; first joint extending to middle of pronotum, rather robust, and feebly clavate; third joint three-fourths as long as first joint, and subequal in length to fourth. Pronotum twice as wide as long, and slightly narrower at base than apex; sides feebly expanded from apical angles to a slender tooth placed slightly behind middle, then strongly obliquely narrowed to base, the tooth rather long, slender, acute at apex, and bent obliquely backward; surface feebly convex, with a narrow transverse groove along anterior and posterior margins, densely, finely punctate, with a few larger punctures from which arises a long erect stiff black hair, and rather densely clothed with long recumbent yellowish white pubescence. Scutellum broadly rounded behind and densely pubescent. Elytra slightly wider than pronotum at middle and moderately convex; sides nearly parallel to apical third, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface with rows of coarse, closely placed punctures, the rows extending nearly to apex, between which are a few coarse black elevated punctures from which arises a long erect stiff black hair, rather densely clothed with short brown recumbent pubescence, and ornamented with yellowish white pubescent markings as noted above. Beneath finely densely punctate, and densely clothed with moderately long recumbent yellowish pubescence, and with long erect black hairs, especially on the legs; last abdominal segment subtruncate at apex.

Length, 5 millimeters; width, 1.9.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single male specimen collected at the type locality (*Baker 13490*).

This species is closely allied to *E. mindanaoensis* sp. nov., but is light brown above, the eyes are not as widely separated on the top, and the pubescence on the elytra is more or less arranged in longitudinal rows.

**Exocentrus philippinus** sp. nov.

*Female.*—Head black; pronotum reddish brown, slightly paler along anterior and posterior margins; elytra brownish black, with a slight reddish tinge in some parts, and irregularly ornamented with yellowish white pubescence, which forms a more distinct broad irregular fascia at apical third; beneath black, with the median parts and legs more or less reddish.

Head moderately transverse and nearly flat in front, as wide as pronotum at apex, and feebly concave between the antennal tubercles, which are short and widely separated; surface with a narrow obsolete longitudinal groove extending from occiput to epistoma, rather densely, finely granulose, the granules somewhat confluent on the median part, sparsely clothed with moderately long semierect cinereous pubescence, and with a few long erect black hairs intermixed; mandibles black; palpi black, the tips reddish; eyes very large and deeply emarginate, the lower lobes quadrate and strongly convex, the upper lobes narrow and separated on the top by half the distance that separates the lower lobes on the front. Antennæ slightly longer than body, rather slender, reddish brown, base of first eight joints slightly more reddish, sparsely clothed with short recumbent cinereous pubescence, and with numerous long erect hairs intermixed; first joint long, extending nearly to base of pronotum, rather robust and cylindrical; third joint two-thirds as long as first joint, and subequal in length to fourth, the following joints gradually diminishing in length. Pronotum one and three-fifths times as wide as long, and distinctly narrower at base than apex; sides nearly parallel from anterior margin to a rather broad tooth placed just behind middle, then strongly arcuately emarginate to base, the tooth long, acute at apex, and bent obliquely backward; surface feebly convex, obsoletely transversely depressed along base, densely finely granulose, the granules more or less confluent and with a few larger ones intermixed, rather densely clothed with long recumbent yellowish white pubescence, and with a few long erect black hairs over the surface. Scutellum broadly rounded behind and densely pubescent. Elytra distinctly wider than pronotum at middle and somewhat depressed on basal half; sides nearly parallel to apical third, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface coarsely, densely, and irregularly punctate, the punctures becoming obsolete toward apex, sparsely clothed with short inconspicuous brown pubescence, with numerous long erect stiff black hairs intermixed, and ornamented with yellowish white pubescence as follows: An obsolete broken humeral spot extending from lateral margin to middle of disk and backward to middle, with a few hairs of the same color extending obliquely backward to suture; a broad, more distinct, irregular fascia at apical third, behind which are a few longitudinal rows of small elongate spots extending to apex. Beneath finely densely punctate, densely clothed with long recumbent cinereous pubescence, and with a few long erect black hairs intermixed; last abdominal segment truncate at apex, transversely, narrowly, and deeply grooved along apical margin, and with a broad shallow depression in front of the groove.

*Male.*—Differs from female in being smaller and slenderer, antennæ slightly longer, head not quite as densely pubescent in front, and the last abdominal segment broadly rounded at apex.

Length, 4.5 to 7 millimeters; width, 1.75 to 2.5.

*Type locality.*—Sibuyan Island, Philippines.

*Other localities.*—Zamboanga and Davao, Mindanao, Philippines.

Type, allotype, and paratypes in United States National Museum; paratype in collection of C. F. Baker.

Described from five specimens. Type, allotype, and one male paratype from the type locality, one female paratype from Zamboanga (*Baker 13497*), and another female paratype from Davao (*Baker 6747*). The paratype from Zamboanga is slightly more reddish than the type.

**Exocentrus angusticollis** sp. nov.

*Female.*—Head brownish black; pronotum and elytra brown, the latter irregularly ornamented with cinereous pubescence; beneath yellowish brown.

Head strongly transverse and nearly flat in front, as wide as pronotum at apex, and feebly concave between the antennal tubercles, which are short and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, rather densely, finely granulose, the granules distinctly separated, very sparsely clothed with moderately long cinereous pubescence, with a few long erect black hairs intermixed; mandibles reddish brown, the tips black; palpi brownish yellow; eyes moderately large and very deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes rather narrow and separated from each other on the top by one-third the distance that separates the lower lobes on the front. Antennæ not longer than body (tenth and eleventh joints missing), slender, uniformly yellowish brown, sparsely clothed with short inconspicuous pubescence, and with numerous long erect black hairs intermixed; first joint extending to middle of pronotum, rather robust, and subfusiform; third joint two-thirds as long as first joint, and subequal in length to fourth, the following joints only obsoletely shorter. Pronotum one and one-third times as wide as long, distinctly narrower at base than apex; sides nearly parallel to a broad tooth placed at basal third, then strongly arcuately emarginate to base, the tooth rather short, acute at apex, and bent obliquely backward; surface moderately convex, with a broad but not deep transverse depression along base, granulose similar to that of head, very sparsely clothed with long recumbent cinereous pubescence, and with a few long erect black hairs over the surface. Scutellum broadly rounded behind and densely clothed with long recumbent cinereous pubescence. Elytra distinctly wider than pronotum at middle and moderately convex; sides nearly parallel to middle, arcuately expanded at apical third, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface densely coarsely punctate on sutural region and along lateral margins, the punctures forming more or less distinct rows on middle of disk and becoming obsolete near apex, very sparsely clothed with inconspicuous pubescence, and ornamented with longer recumbent cinereous pubescence, which is arranged in more or less broken longitudinal rows, forming an obsolete fascia at basal third and one just behind middle, between which is a more distinct broad transverse brown fascia; the surface is also clothed with numerous long erect stiff black hairs. Beneath finely densely punctate, rather densely clothed with moderately long recumbent cinereous pubescence, with a few long erect black hairs intermixed; last abdominal segment truncate at apex, with a small triangular emargination at middle, transversely narrowly grooved along apical margin, and with a broad triangular depression in front of groove.

Length, 3.4 millimeters; width, 1.25.

*Type locality.*—Dapitan, Mindanao, Philippines.

Type in United States National Museum.

Described from a single female collected at the type locality (*Baker 13511*).

This species is very closely allied to *E. moerens* Pascoe described from Singapore but, according to the description, that species has the cinereous markings on the elytra arranged differently, and the body beneath is somewhat different in color.

**Myromeus fumosus** sp. nov.

*Female.*—Above uniformly brownish black, densely pubescent. the elytra ornamented with yellowish white pubescent markings; beneath reddish black.

Head transverse and moderately convex in front, as wide as pronotum at apex, flat between the antennal tubercles, which are short and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, densely obsoletely punctate, densely clothed with long recumbent cinereous pubescence, and with a few long erect hairs intermixed;

mandibles black, slightly reddish brown at base; palpi brownish yellow; eyes moderately large and deeply emarginate, the lower lobes rounded and feebly convex, the upper lobes narrow and separated from each other on the top by about half the distance that separates the lower lobes on the front. Antennæ one and one-third times as long as body, slender, uniformly brownish black, sparsely clothed with short recumbent brownish pubescence, except on basal part of intermediate joints where it is cinereous, and rather densely ciliate on underside with long erect black hairs; first joint extending to middle of pronotum, rather robust, and subfusiform; third joint about equal in length to first joint, and slightly shorter than fourth, the following joints gradually diminishing in length. Pronotum quadrate, base and apex about equal in width; sides slightly arcuately rounded, with a short acute tooth placed slightly behind middle, which is feebly inclined backward; surface moderately convex, coarsely but not very densely punctate, densely clothed with moderately long recumbent brownish gray pubescence, which is slightly more cinereous toward sides, and with a few long erect black hairs intermixed. Scutellum more or less triangular, subtruncate at apex. Elytra distinctly wider than pronotum at base, slightly depressed on basal half, sides nearly parallel to apical fourth, then arcuately attenuate to the tips, which are separately broadly rounded; surface coarsely and rather densely punctate, the punctures becoming obsolete toward apex, densely clothed with recumbent brownish gray pubescence, obsoletely marbled with cinereous pubescence, with a few long erect black hairs intermixed, each elytron ornamented with yellowish white pubescent markings as follows: An elongate spot placed obliquely near lateral margin at basal third, a very small spot along suture at basal third, a small round spot near apical third situated a considerable distance from lateral margin, and a large irregularly shaped spot along suture near apex. Beneath densely, finely punctate, rather densely clothed with moderately long recumbent cinereous pubescence, and with numerous long erect cinereous hairs intermixed; last abdominal segment with a deep semicircular depression at apex.

*Male.*—Similar to female, but differs from it in having the antennæ slightly longer; the elytra more obliquely attenuate from the humeral angles, and the markings more cinereous; the prosternum more densely clothed with fine long erect cinereous hairs; and the last abdominal segment broadly rounded at apex.

Length, 6.2 to 8.5 millimeters; width, 2.25 to 3.

*Type locality.*—Dapitan, Mindanao.

*Other localities.*—Basilan Island and Iligan, Mindanao, Philippines.

Type and allotype in United States National Museum; paratype in collection of C. F. Baker.

Described from three specimens. Female type from Dapitan, Mindanao, male allotype from Basilan Island (*Baker 13499*), and a male paratype from Iligan, Mindanao.

**Myromeus fulvonotatus** sp. nov.

*Female.*—Above brownish black, densely pubescent, with a distinct yellow pubescent spot on each side of elytra along lateral margin; beneath black, slightly reddish on the median parts.

Head transverse and moderately convex in front, as wide as pronotum at apex, feebly concave between the antennal tubercles, which are rather short and widely separated; surface with a narrow obsolete longitudinal groove on vertex, not extending on occiput nor on front, densely, finely, and distinctly punctate, densely clothed with long recumbent cinereous pubescence, and with numerous long erect hairs intermixed; mandibles black; palpi dark brown, the tips paler; eyes moderately large and deeply emarginate, the lower lobes rounded and moderately convex, the upper lobes narrow and separated on the top by about half the distance that separates the lower lobes on the front. Antennæ about one and one-fourth times as long as body, slender, uniformly black, sparsely clothed with short recumbent blackish pubescence, except on basal part of intermediate joints, where it is cinereous, and densely ciliate on underside with long erect black hairs; first joint extending to middle of pronotum, rather robust, and subfusiform or cylindrical; third joint about equal in length to first joint and distinctly shorter than fourth. Pronotum nearly quadrate, feebly narrower at base than apex; sides slightly arcuately rounded, with a short rather obtuse tooth at middle, which is not inclined backward; surface moderately convex, obsoletely broadly transversely depressed near base and apex, sparsely coarsely punctate, rather densely clothed with recumbent featherlike brownish and cinereous pubescence, and with a few long erect black hairs intermixed. Scutellum triangular, subtruncate at apex. Elytra distinctly wider than pronotum, slightly depressed on basal half, sides nearly parallel to apical third, then arcuately attenuate to the tips, which are separately broadly rounded; surface rather densely, coarsely punctate, the punctures nearly concealed by the pubescence and becoming obsolete toward apex, very densely clothed with moderately long recumbent cinereous pubescence, with a few long erect black hairs intermixed, each elytron ornamented with more or less obsolete light brown pubescent markings as follows: A large spot surrounding scutellum; a small round spot behind humerus; a similar spot along suture just in front of middle; and behind middle two fasciæ extending from lateral margin obliquely backward but not reaching suture; there is also a distinct spot of yellow pubescence just behind the humeral brown spot. Beneath densely finely punctate, rather densely clothed with short recumbent cinereous pubescence, the legs densely clothed with long erect hairs of the same color; last abdominal segment with a deep semicircular depression at apex.

Length, 6 millimeters; width, 2.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality.

**Myromeus luzonicus** sp. nov.

*Female.*—Above uniformly brownish black, densely clothed with cinereous pubescence, the elytra ornamented with distinct brownish pubescent markings; beneath black, slightly reddish on the median parts.

Head transverse and moderately convex in front, as wide as pronotum at apex, feebly concave between the antennal tubercles, which are rather short and widely separated; surface with a narrow longitudinal groove, extending from vertex to middle of front, densely, finely, and distinctly punctate, rather densely clothed with long recumbent cinereous pubescence, and with a few long erect hairs intermixed; mandibles black; palpi brownish yellow; eyes large and deeply emarginate, the lower lobes rounded and feebly convex, the upper lobes narrow and separated from each other on the top by a little less than half the distance that separates the lower lobes on the front. Antennæ about one and one-third times as long as body, slender, uniformly brownish black, sparsely clothed with short brown recumbent pubescence, and in addition the first eight joints more or less clothed with longer cinereous pubescence, and rather densely ciliate on underside with long erect black hairs; first joints extending to middle of pronotum, rather robust and cylindrical; third joint about equal in length to first, and only obsoletely shorter than fourth. Pronotum quadrate, apex slightly wider than base; sides slightly arcuately rounded, with a short acute tooth placed slightly behind middle, which is feebly inclined backward; surface moderately convex, densely coarsely punctate, densely clothed with moderately long recumbent cinereous pubescence, with numerous long erect black hairs intermixed. Scutellum more or less triangular and subtruncate at apex. Elytra distinctly wider than pronotum, slightly depressed on basal half, sides feebly obliquely attenuate to apical fourth, then strongly arcuately attenuate to the tips, which are separately broadly rounded; surface coarsely, densely punctate, the punctures becoming obsolete toward apex, very densely clothed with long recumbent cinereous pubescence, with a few long erect black hairs intermixed, each elytron ornamented with recumbent brown pubescent markings as follows: A transverse fascia near base, extending along suture to scutellum, and externally beyond middle of disk, where it is obliquely connected to a rounded spot behind humerus; a broad transverse fascia at middle, extending from near lateral margin to near suture, then obliquely forward along suture to near anterior fascia, to which it is narrowly connected; and a large irregular transverse spot at apical third, extending from lateral margin to suture, with anterior margin distinct and strongly arcuately rounded, posterior margin not distinctly defined. Beneath finely densely punctate, rather densely clothed with short recumbent cinereous pubescence, and with a few long erect hairs of the same color scattered over body and legs; last abdominal segment with a deep semicircular depression at apex.

*Male.*—Similar to female, but the specimen is badly rubbed, and the markings are more or less destroyed. It differs from the type in having the antennæ slightly longer; the elytra more obliquely attenuate from the humeral angles; the prosternum densely clothed with rather fine long erect cinereous hairs; and the last abdominal segment broadly rounded at apex.

Length, 8.75 to 9.5 millimeters; width, 2.75 to 3.1.

*Type locality.*—Mount Maquiling, Luzon.

*Other locality.*—Mount Limay, Luzon, Philippines.

Type and allotype in United States National Museum.

Described from two specimens, male and female; the female collected at Mount Maquiling (*Baker 13498*) and the male at Mount Limay (*Baker 3040*).

**Enes luzonicus sp. nov.**

*Female.*—Head and pronotum black and strongly shining; elytra brownish black, subopaque, and ornamented with cinereous pubescence; beneath black, with parts of sternum, base of femora and tibiæ brownish black or reddish brown; tarsi with the outer joints becoming paler.

Head transverse and strongly convex in front, about as wide as pronotum, feebly concave between the antennal tubercles, which are moderately long and widely separated; surface finely obsoletely punctate, rather densely clothed with moderately long semierect cinereous hairs, and with a few long erect hairs intermixed; mandibles reddish brown, becoming black at the tips; palpi luteous; eyes large and very deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes narrow and separated from each other on the top by about one-third the distance that separates the lower lobes on the front. Antennæ about one and one-half times as long as body, slender, uniformly brownish black, sparsely clothed with short inconspicuous pubescence, and with numerous long erect hairs intermixed; first joint scarcely reaching to middle of pronotum, rather robust and fusiform; third joint equal in length to first and slightly shorter than fourth; the following joints gradually diminishing in length. Pronotum slightly longer than wide (exclusive of teeth at sides), base and apex about equal in width; sides nearly parallel, feebly constricted near anterior and posterior angles, and with a moderately long acute tooth near middle; base and anterior margin transversely truncate; surface regularly convex, with a broad, shallow transverse depression near base, and a similar indistinct one near anterior margin, finely obsoletely punctate, rather sparsely clothed with short inconspicuous cinereous pubescence, and with numerous long erect black hairs intermixed. Scutellum somewhat triangular and subtruncate at apex. Elytra considerably wider than pronotum, the sides nearly parallel to apical fourth, then arcuately attenuate to the tips, which are separately rounded; surface rather densely, coarsely punctate, the punctures regularly placed in rows on the basal two-thirds, but becoming obsolete toward apex, sparsely clothed with inconspicuous brown pubescence with numerous long erect hairs intermixed, and each elytron ornamented with moderately long recumbent cinereous pubescence as follows: A large irregular spot inclosing some small dark areas at basal fourth, extending from lateral margin to suture; a rather broad transverse fascia at apical third; a large spot covering apical fifth; and a few small round spots along suture. Beneath finely densely punctate, and rather densely clothed with moderately long recumbent cinereous pubescence, which is sparser on prosternum and legs, and with numerous long erect cinereous hairs; last abdominal segment with a large, deep, semicircular depression at apex.

*Male.*—Similar to female, but the eyes are closer together on the top, not as densely pubescent beneath, and the last abdominal segment rounded at apex and without the semicircular depression.

Length, 3.5 to 4.5 millimeters; width, 1 to 1.6.

*Type locality.*—Mount Maquiling, Luzon, Philippines.

Type and allotype in United States National Museum; paratype in collection of C. F. Baker.

Described from three specimens, two males and one female, all collected at the type locality (*Baker 13492, 21715*).

**Enes marmoratus** sp. nov.

*Female.*—Above black, subopaque, the elytra regularly variegated with cinereous pubescence; beneath reddish black, with base of femora reddish yellow.

Head transverse and strongly convex in front, about as wide as pronotum, nearly flat between the antennal tubercles, which are short and widely separated; surface sparsely obsoletely punctate, rather densely clothed with moderately long, semierect cinereous hairs, and with numerous long erect hairs intermixed; mandibles reddish brown, becoming black at the tips; palpi brownish yellow; eyes large and very deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes narrow and separated from each other on the top by about one-third the distance that separates the lower lobes on the front. Antennæ one and one-third times as long as body, slender, reddish brown, with base of joints paler, sparsely clothed with short inconspicuous pubescence, and with numerous long erect hairs intermixed, first joint scarcely reaching to middle of pronotum, rather robust, and fusiform; third joint slightly shorter than first, and distinctly shorter than fourth joint, the following joints gradually diminishing in length. Pronotum slightly longer than wide and feebly narrower at base than apex; sides nearly parallel, distinctly so at base, and with a moderately long acute tooth placed slightly behind middle; surface regularly convex; with a distinct, moderately deep, transverse groove at basal third, densely finely punctate, rather densely clothed with short recumbent blackish pubescence, obsoletely marbled with cinereous pubescence, and with a few long erect hairs intermixed. Scutellum small, somewhat triangular, and narrowly rounded behind. Elytra considerably wider than pronotum, the sides parallel to apical fourth, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface rather densely, coarsely punctate, the punctures more or less arranged in rows at the sides, and becoming obsolete toward apex, rather sparsely clothed with short inconspicuous black pubescence, and irregularly variegated with coarser cinereous pubescence, except at base, a triangular spot along lateral margin near middle; at apex, where the spots are more widely separated, there are also numerous long erect hairs over the entire surface. Beneath finely densely punctate, and rather densely clothed with long cinereous pubescence, and with numerous long erect cinereous hairs intermixed; last abdominal segment broadly, deeply, triangularly, and abruptly flattened at apex.

Length, 4 millimeters; width, 1.3.

*Type locality*.—Dapitan, Mindanao, Philippines.

Type in United States National Museum.

Described from a single female collected at the type locality (*Baker 13491*).

**Enes pallidus** sp. nov.

*Male*.—Above uniformly light brown, subopaque, the elytra variegated with yellowish white pubescence; beneath reddish brown, with the median parts, base of femora, tibiæ, and tarsi more or less luteous.

Head transverse and strongly convex in front, about as wide as pronotum, nearly flat between the antennal tubercles, which are short and widely separated; surface with an obsolete longitudinal groove, sparsely obsoletely punctate, rather densely clothed with moderately long semierect yellowish white pubescence and with a few long erect hairs intermixed; mandibles reddish brown, the tips black; palpi luteous; eyes large and very deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes narrow and separated from each other on the top by about one-third the distance that separates the lower lobes on the front. Antennæ about one and one-third times as long as body, slender, luteous, with the tips of the joints darker, sparsely clothed with short inconspicuous pubescence, and with numerous long erect black hairs intermixed; first joint not extending to middle of pronotum, rather robust and fusiform; third joint slightly longer than first and about subequal in length to fourth. Pronotum slightly longer than wide and feebly narrower at base than apex; sides nearly parallel and with a moderately long acute tooth at middle; surface regularly convex, with a broad shallow transverse groove at basal third, obsoletely punctate, densely clothed with long recumbent yellowish white pubescence (except for a narrow longitudinal glabrous spot at middle), and with a few long erect black hairs over the surface. Scutellum small, subtruncate at apex. Elytra considerably wider than pronotum, the sides parallel to middle, then gradually arcuately attenuate to the tips, which are separately narrowly rounded; surface rather densely, coarsely punctate in basal region, the punctures arranged in rows at the sides, and becoming obsolete on apical third, rather sparsely clothed with short inconspicuous brown pubescence, irregularly variegated with yellowish white pubescence, and each elytron with a more distinct large brown spot along lateral margin at middle; there are also numerous long erect black hairs over the entire surface. Beneath finely densely punctate, and rather densely clothed with moderately long cinereous pubescence, and with scarcely any longer hairs intermixed; last abdominal segment broadly rounded at apex.

*Female.*—Similar to male, only slightly darker, the head and pronotum more brownish black, the latter with the anterior margin paler, the eyes more widely separated from each other on the top, and the last abdominal segment with a deep semicircular depression at apex.

Length, 3.2 to 3.7 millimeters; width, 1.1 to 1.4.

*Type locality.*—Basilan Island, Philippines.

Type and allotype in United States National Museum.

Described from two specimens, male and female, collected at the type locality (*Baker 13510*).

### Enes spinosus sp. nov.

*Male.*—Head and pronotum black, the latter with the anterior and posterior margins reddish yellow; elytra dark brown and densely variegated with more or less confluent cinereous spots; beneath reddish or brownish black, posternum and base of femora more or less luteous.

Head transverse and moderately convex in front, about as wide as pronotum, feebly concave between the antennal tubercles, which are rather short and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, sparsely obsoletely punctate, sparsely clothed with rather short recumbent cinereous pubescence, and with a few long erect hairs intermixed; mandibles reddish brown, the tips black; palpi luteous; eyes large and deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes smaller and separated from each other on the top by about one-third the distance that separates the lower lobes on the front. Antennæ not much longer than body, slender, reddish brown, base of joints paler, sparsely clothed with short inconspicuous pubescence and with numerous long erect hairs intermixed; first joint not extending to middle of pronotum, rather robust, and fusiform; third joint about equal in length to first joint and distinctly shorter than fourth. Pronotum slightly longer than wide, apex and base about equal in width; sides nearly parallel, distinctly so at basal fourth, and with a moderately long acute tooth, placed slightly behind middle; surface regularly convex, with a broad shallow transverse groove at basal fourth, obsoletely punctate, rather densely clothed with fine recumbent cinereous pubescence (except a narrow obsolete glabrous spot on middle of disk), and with numerous long erect black hairs intermixed. Scutellum rather narrowly rounded behind. Elytra considerably wider than pronotum, the sides parallel to apical fourth, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface densely, coarsely punctate, the punctures more or less arranged in rows at sides of disk, and becoming obsolete toward apex, rather densely clothed with inconspicuous brown pubescence, and densely variegated with moderately long recumbent cinereous pubescence, the cinereous spots irregularly placed, confluent, and with a larger brown area around scutellum, numerous long erect hairs over entire surface, the hairs black on disk and cinereous at sides. Beneath densely finely punctate, densely clothed with moderately long recumbent cinereous pubescence, and with numerous long erect cinereous hairs intermixed; last abdominal segment broadly rounded at apex.

Length, 4.5 millimeters; width, 1.6.

*Type locality.*—Cuernos Mountains, Negros, Philippines.

Type in United States National Museum.

Described from a single male collected at the type locality.

**Enes bakeri** sp. nov.

*Male.*—Above uniformly black, head and pronotum strongly shining, elytra subopaque and sparsely irregularly ornamented with cinereous pubescence; beneath black, coxæ, base of femora, tibiæ, and tarsi more reddish.

Head transverse and strongly convex in front, about as wide as pronotum, nearly flat between the antennal tubercles, which are short and widely separated; surface with an obsolete longitudinal groove on vertex, sparsely obsoletely punctate, rather densely clothed with moderately long semierect cinereous pubescence, and with a few long erect hairs intermixed; mandibles reddish brown, the tips black; palpi yellowish brown; eyes large and nearly divided, the lower lobes rounded and strongly convex, the upper lobes smaller and separated from each other on the top by about one-third the distance that separates the lower lobes on the front. Antennæ only a little longer than body, slender, reddish brown, base of joints slightly paler, sparsely clothed with short inconspicuous pubescence, and with numerous long erect hairs intermixed; first joint not extending to middle of pronotum, rather robust and fusiform; third joint about equal in length to first joint and distinctly shorter than fourth. Pronotum distinctly longer than wide, apex and base about equal in width; sides nearly parallel, feebly constricted near anterior and posterior angles, and with a moderately long acute tooth, placed slightly behind middle; surface regularly convex, with a narrow, moderately deep transverse groove at basal fifth and a broad obsolete one near anterior margin, obsoletely punctate, sparsely clothed with very short inconspicuous cinereous pubescence, and with numerous long erect black hairs intermixed. Scutellum somewhat triangular, subtruncate at apex. Elytra considerably wider than pronotum, sides feebly attenuate from humeral angles to near apex, where they are more strongly arcuately attenuate to the tips, which are separately narrowly rounded; surface densely coarsely punctate, the punctures arranged in rows but becoming obsolete at apex, sparsely clothed with inconspicuous brown pubescence, with numerous long erect black hairs intermixed, each elytron ornamented with recumbent cinereous pubescence as follows: A small spot at middle of base; a crescent-shaped fascia (sometimes broken) along lateral margin behind humerus; a number of irregularly shaped spots, more or less confluent, on disk in front of a narrow transverse fascia at apical third, the fascia not extending to suture nor to lateral margin, and bent obliquely backward laterally, the apical area obsoletely covered with inconspicuous hairs of the same color. Beneath densely finely punctate, rather densely clothed with short recumbent cinereous pubescence, which is longer and more conspicuous along posterior margin of abdominal segments, and with numerous long erect hairs of the same color intermixed; last abdominal segment broadly rounded at apex.

*Female.*—Similar to male, but the antennæ a little shorter, sides of elytra more parallel, more reddish beneath, and last abdominal segment with a broad, deep, triangular depression at apex.

Length, 4 to 5 millimeters; width, 1.2 to 1.5.

*Type locality.*—Sibuyan Island, Philippines.

*Other locality.*—Cuernos Mountains, Negros, Philippines.

Type, allotype, and paratype in the United States National Museum; paratype in collection of C. F. Baker.

Described from four specimens, male and female, collected at the type locality (*Baker 21712, 21713*), and a male and female from Cuernos Mountains.

**Enes sibuyana** sp. nov.

*Female.*—Head and pronotum brownish black and strongly shining, the latter slightly reddish along anterior and posterior margins; elytra reddish brown, subopaque, slightly darker in scutellar region, more yellowish at apex, and irregularly ornamented with cinereous pubescent spots; beneath reddish brown, with prosternum and legs more or less reddish yellow.

Head transverse and moderately convex in front, about as wide as pronotum, feebly concave between the antennal tubercles, which are rather short and widely separated; surface sparsely obsoletely punctate, densely clothed with moderately long semierect cinereous pubescence, with a few long erect hairs intermixed; mandibles reddish brown, the tips black; palpi luteous; eyes large and nearly divided, the lower lobes rounded and strongly convex, the upper lobes smaller and separated from each other on the top by one-third the distance that separates the lower lobes on the front. Antennæ about one and one-third times as long as body, slender, reddish brown, the outer joints slightly paler at base, sparsely clothed with short inconspicuous pubescence, with numerous long erect hairs intermixed; first joint not quite extending to middle of pronotum, rather robust and fusiform; third joint about equal in length to first joint, and distinctly shorter than fourth. Pronotum distinctly longer than wide, base and apex about equal in width; sides nearly parallel, feebly constricted near base, with a moderately long acute tooth placed distinctly behind middle; surface regularly convex, with a narrow, moderately deep transverse groove near base, nearly smooth, sparsely clothed with very short inconspicuous pubescence, with numerous long erect black hairs intermixed. Scutellum triangular, rather acutely rounded at apex. Elytra considerably wider than pronotum, sides nearly parallel to apical third, then arcuately attenuate to the tips, which are conjointly broadly rounded; surface densely, coarsely punctate, the punctures more or less arranged in rows at sides and becoming obsolete toward apex, sparsely clothed with inconspicuous brown pubescence, with numerous long erect black hairs intermixed, each elytron ornamented with recumbent cinereous pubescence as follows: A small spot at middle of base; two transverse spots along lateral margin behind humerus; a number of small irregularly placed spots on disk in front of a narrow transverse fascia at apical third, the fascia not quite reaching to suture but extending backward along lateral margin but not touching it; and an obsolete spot along suture midway between fascia and apex. Beneath densely finely punctate, rather densely clothed with short recumbent cinereous pubescence, which is longer and more conspicuous along posterior margin of abdominal segments, with long erect cinereous hairs, which are more abundant on the legs; last abdominal segment with a broad, deep, triangular depression at apex.

Length, 5.5 millimeters; width, 1.6.

*Type locality.*—Sibuyan Island, Philippines.

Type in United States National Museum.

Described from a single female collected at the type locality.

**Enes setiger** sp. nov.

*Female.*—Head and pronotum black, subopaque; elytra dark brown and rather regularly variegated over entire surface with small yellowish white pubescent spots; beneath yellowish brown, legs luteous, with the median parts of femora more or less brownish.

Head transverse and strongly convex in front, about as wide as pronotum, nearly flat between the antennal tubercles, which are short and widely separated; surface sparsely obsoletely punctate, densely clothed with long semierect cinereous pubescence, with a few long erect hairs intermixed; mandibles reddish brown, the tips black; palpi luteous; eyes large and nearly divided, the lower lobes rounded and strongly convex, the upper lobes smaller and separated from each other on the top by nearly one-third the distance that separates the lower lobes on the front. Antennæ about one and one-third times as long as body, slender, brownish yellow, base of joints slightly paler, sparsely clothed with short inconspicuous pubescence, with numerous long erect hairs intermixed; first joint not extending to middle of pronotum, rather robust, cylindrical or subfusiform; third joint about equal in length to first joint, and distinctly shorter than fourth. Pronotum distinctly longer than wide, apex and base about equal in width; sides nearly parallel, distinctly so at base, and with a moderately long acute tooth at middle; surface regularly convex, with a broad shallow transverse depression at basal third, and a similar indistinct one at apical third; finely densely punctate, sparsely clothed with short indistinct cinereous pubescence, with four obsolete darker spots on disk, with a few long, erect black hairs. Scutellum small and broadly rounded behind. Elytra considerably wider than pronotum, the sides parallel to apical fourth, then arcuately attenuate to the tips, which are separately broadly rounded; surface densely, coarsely punctate, the punctures irregularly placed in scutellar region, but arranged in rows at sides and posteriorly, and extending nearly to apex, rather densely clothed with short inconspicuous brown pubescence, and variegated with small yellowish white pubescent spots; there are also numerous long erect black hairs over the entire surface. Beneath densely finely punctate, rather densely clothed with moderately long cinereous pubescence, with numerous long erect white hairs intermixed; last abdominal segment with a deep simicircular depression at apex.

Length, 4.2 millimeters; width, 1.5.

*Type locality.*—Basilan Island, Philippines.

Type in United States National Museum.

Described from a single female collected at the type locality.

**Enes scutellaris** sp. nov.

*Female.*—Above reddish brown, pronotum slightly darker on disk, elytra ornamented with dark brown areas as follows: A large scutellar spot; a small spot at humeral angles; a rather broad transverse fascia at middle, not extending to suture, but strongly constricted at middle; and the entire apical third, inclosing a large, more or less triangular pale space; all of these dark areas, except the scutellar one, are connected to each other along the lateral margins; beneath yellowish brown, legs luteous, apex of femora and tibiæ brownish.

Head transverse and moderately convex in front, about as wide as pronotum, feebly concave between the antennal tubercles, which are rather short and widely separated; surface densely finely punctate, rather densely clothed with short recumbent brownish yellow pubescence, with a few longer, erect hairs intermixed; mandibles reddish brown, the tips black; palpi brownish yellow; eyes large and deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes smaller and separated from each other on the top by about half the distance that separates the lower lobes on the front. Antennæ one and one-half times as long as body, slender, dark brown, scape and base of other joints brownish yellow, sparsely clothed with short inconspicuous pubescence, and with numerous long, erect hairs intermixed; first joint not extending to middle of pronotum, rather robust, cylindrical, and feebly arcuate; third joint about equal in length to first joint, and distinctly shorter than fourth. Pronotum slightly wider than long, apex and base about equal in width; sides parallel, with a moderately long, acute tooth placed slightly behind middle, which is feebly inclined backward; surface regularly convex, with a broad transverse obsolete depression at basal third, finely densely punctate, densely clothed with moderately long recumbent pubescence, which is denser and more yellowish at middle and toward sides, and with numerous long erect black hairs intermixed; there is also on each side of middle, parallel with the lateral teeth, a large round deep puncture. Scutellum broadly rounded behind. Elytra considerably wider than pronotum, somewhat depressed above, sides parallel to apical third, then arcuately attenuate to the tips, which are separately broadly rounded; surface with an obsolete longitudinal carina extending from humeri backward to near middle, densely coarsely punctate, the punctures more or less arranged in rows and becoming obsolete toward apex, densely clothed, except on the scutellar dark area, with moderately long recumbent pubescence (brown or reddish brown on the dark areas and yellowish white on the pale areas) as noted above. Beneath finely densely punctate, densely clothed with fine recumbent yellowish white pubescence, with numerous long erect hairs on the legs; last abdominal segment with a deep semicircular depression at apex.

Length, 4.8 millimeters; width, 1.9.

*Type locality.*—Sibuyan Island, Philippines.

Type in United States National Museum; paratype in collection of C. F. Baker.

Described from two females collected at the type locality (*Baker 21711*). The paratype is slightly paler than the type, but otherwise they are identical.

**Xaenapta denticollis** sp. nov.

*Female.*—Above dark brown, elytra slightly reddish on disk and ornamented with cinereous pubescence; beneath reddish brown, legs more or less luteous.

Head transverse and moderately convex in front, as wide as pronotum, and flat between the antennal tubercles, which are short and widely separated; surface sparsely scabrous, rather sparsely clothed with moderately long semierect cinereous pubescence, with numerous long erect hairs intermixed; mandibles reddish brown, becoming black at the tips; palpi brownish yellow; eyes moderately large and very deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes narrow and widely separated from each other on the top. Antennæ about one and one-half times as long as body, slender, uniformly light brown except the first four joints, which are slightly paler toward base, sparsely clothed with short inconspicuous pubescence, ciliate on underside with long erect black hairs; first joint short, extending to middle of pronotum, subcylindrical, but not very robust; third joint slightly longer than first joint and distinctly shorter than fourth, the following joints gradually diminishing in length. Pronotum slightly wider than long and distinctly narrower at base than apex; sides arcuately rounded and armed with a number of short acute teeth; surface feebly convex, sparsely, rather finely scabrous, with a large puncture on each side behind middle, and situated midway between lateral margin and middle, rather densely clothed on median line and at sides with moderately long recumbent cinereous pubescence, and with numerous long erect inconspicuous hairs intermixed. Scutellum broadly rounded at apex and densely clothed with cinereous pubescence. Elytra about as wide as pronotum at middle, sides parallel to apical third, then arcuately attenuate to the tips, which are separately narrowly rounded; surface densely, coarsely punctate, the punctures irregularly placed toward suture and lateral margins, but arranged in rows at middle of disk, and becoming more obsolete toward apex, rather densely variegated with moderately long recumbent cinereous pubescence, except for a dark area around scutellum and along lateral margins, and also clothed with numerous long erect fine hairs. Beneath densely obsoletely punctate, rather densely clothed with moderately long recumbent cinereous pubescence, with numerous long erect hairs of the same color intermixed, the longer hairs very conspicuous on the legs; last abdominal segment transversely narrowly flattened at apex, and with a moderately deep triangular depression in front of the flattened area.

Length, 4.25 millimeters; width, 1.4.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality.

### Xaenapta bakeri sp. nov.

*Female.*—Head black; pronotum and elytra brownish black, the latter with distinct silvery white pubescent markings; beneath brownish black, with a slight reddish tinge, tarsi paler.

Head transverse and moderately convex in front, as wide as pronotum, and flat between the antennal tubercles, which are short and widely separated; surface sparsely obsoletely scabrous, densely clothed with moderately long recumbent cinereous pubescence, with a few long erect hairs intermixed; mandibles reddish brown, the tips black; palpi brownish yellow; eyes moderately large and very deeply emarginate, the lower lobes rounded and strongly convex, and the upper lobes narrow and widely separated from each other on the top. Antennæ one and one-half times as long as body, slender, reddish brown, becoming yellowish brown on the outer joints, sparsely clothed with short recumbent cinereous pubescence (the pubescence more yellowish and inconspicuous on the outer joints), and sparsely ciliate on underside with long erect black hairs; first joint short, extending to middle of pronotum, subcylindrical, feebly arcuate, but not very robust; third joint slightly shorter than fourth joint, which is subequal in length to first. Pronotum slightly wider than long, and distinctly narrower at base than apex; sides arcuately rounded and armed with a number of short acute teeth; surface feebly convex, sparsely coarsely scabrous, rather densely clothed over entire surface, except a triangular median space along anterior margin, with moderately long recumbent cinereous pubescence with numerous long erect black hairs intermixed. Scutellum broadly rounded behind and densely clothed with cinereous pubescence. Elytra about as wide as pronotum at middle, sides parallel to apical third, then arcuately attenuate to the tips, which are separately narrowly rounded; surface densely coarsely punctate, the punctures irregularly placed, except on middle of disk where they are more or less arranged in rows, becoming obsolete toward apex, densely clothed with short silvery white pubescence, except the dark areas where the surface is sparsely clothed with inconspicuous black pubescence, and are arranged as follows: A rather broad fascia extending from humeri obliquely backward to suture at basal third and forming the letter V common to both elytra; a narrow fascia just behind the anterior one, extending from behind humeri obliquely backward to suture, parallel to anterior fascia and forming the letter U, this fascia extending forward along the lateral margins, where it is connected to the anterior fascia, and also backward along the margins for a short distance, and obsoletely connected to a large, more or less triangular spot along margin at middle; and a narrow transverse fascia at apical third, the margins of the fascia more or less undulated; the surface is also clothed with numerous long erect black hairs. Beneath finely densely punctate, rather densely clothed with short recumbent silvery white pubescence, and with numerous long erect hairs intermixed; last abdominal segment transversely, narrowly flattened at apex, with a broad but not deep depression in front of the flattened area.

Length, 5.2 millimeters; width, 1.7.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality (*Baker 13500*).

**Aegocidnus flavomaculatus** sp. nov.

Head brownish yellow; pronotum reddish brown; elytra dark reddish brown, with distinct slightly paler areas densely clothed with yellowish pubescence; beneath reddish or brownish yellow, base of femora luteous, and tibiæ, apex of femora, and first tarsal joints brown.

Head nearly quadrate and feebly convex in front, slightly wider than pronotum at apex, moderately concave between the antennal tubercles, which are rather short and widely separated; surface coarsely sparsely punctate, and sparsely clothed with moderately long recumbent yellowish pubescence; mandibles reddish brown, the tips black; palpi luteous; eyes rather large and very deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes small and separated from each other on the top by one-third the distance that separates the lower lobes on the front. Antennæ nearly twice as long as body, slender, dark brown, base of joints luteous, sparsely clothed with short recumbent pubescence, and rather densely ciliate on underside with longer hairs; first joint extending to middle of pronotum, rather robust, subcylindrical; third joint slightly longer than first and fourth joints, the following joints gradually diminishing in length. Pronotum quadrate, base and apex about equal in width; sides feebly arcuately rounded, with a very small acute tooth placed slightly behind middle; surface moderately convex, without transverse depressions, densely coarsely punctate and sparsely clothed with short recumbent yellowish pubescence on basal half of disk. Scutellum small and narrowly rounded posteriorly. Elytra distinctly wider than pronotum and feebly depressed on basal half; sides nearly parallel to apical third, then arcuately attenuate to the tips, which are separately narrowly rounded; surface densely coarsely punctate, the punctures more or less arranged in longitudinal rows, except along suture, where they are irregularly distributed, sparsely clothed with short inconspicuous brown pubescence, each elytron ornamented with moderately long recumbent yellowish pubescence as follows: A small round spot at base; a large, broad, crescent-shaped spot placed longitudinally on disk at basal third; a transverse fascia at apical third, extending from lateral margin to near suture; and a small obsolete area near apex. Beneath densely obsoletely punctate, with a few coarse deep punctures intermixed on first two abdominal segments, and sparsely clothed with short recumbent yellowish pubescence; last abdominal segment rather broadly rounded at apex.

Length, 3.2 millimeters; width, 1.2.

*Type locality.*—Mount Maquiling, Luzon, Philippines.

Type in United States National Museum.

Described from a single example (sex undetermined) collected at the type locality.

**Miaenia rufula** sp. nov.

Uniformly pale reddish brown, elytra irregularly ornamented with yellowish white pubescence.

Head quadrate and nearly flat in front, about as wide as pronotum at apex, slightly concave between the antennal tubercles, which are rather short and widely separated; surface coarsely but not very densely punctate, sparsely clothed with recumbent yellowish white pubescence; mandibles reddish, the tips black; palpi luteous; eyes moderately large and deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes narrow and separated from each other on the top by a little less than half the distance that separates the lower lobes on the front. Antennæ nearly twice as long as body, slender, dark brown, base of joints and first two or three joints slightly paler, sparsely clothed with short inconspicuous pubescence, and sparsely ciliate on underside with longer hairs; first joint scarcely extending to middle of pronotum, rather robust and subcylindrical; third joint twice as long as first joint and subequal in length to fourth, the following joints gradually diminishing in length. Pronotum quadrate, apex and base about equal in width; sides feebly arcuately rounded, with a small, straight, acute tooth placed slightly behind middle, surface moderately convex, broadly transversely depressed along anterior and posterior margins, the depressions only obsoletely indicated (not sulcate), coarsely and rather densely punctate, and rather densely clothed with moderately long recumbent yellowish white pubescence, which is evenly distributed and does not form any design. Scutellum somewhat triangular, broadly rounded posteriorly. Elytra distinctly wider than pronotum and moderately convex; sides feebly obliquely expanded from humeral angles to apical third, where they are widest, and arcuately rounded, then arcuately attenuate to the tips, which are separately narrowly rounded; surface coarsely, densely, and irregularly punctate, sparsely clothed with moderately long recumbent yellowish white pubescence, forming irregularly shaped designs over the entire surface, and a more or less distinct transverse fascia near basal third. Beneath rather densely, coarsely punctate, and sparsely clothed with short inconspicuous recumbent pubescence; last abdominal segment broadly rounded at apex.

Length, 2.8 millimeters; width, 1.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single example, probably a male, collected at the type locality.

### Miaenia variegata sp. nov.

Head and pronotum brownish black; elytra slightly more reddish brown, and ornamented with cinereous pubescent designs; beneath brownish black, base of femora, tibiæ, and tarsi reddish.

Head slightly transverse and feebly convex in front, about as wide as pronotum at apex, nearly flat between the antennal tubercles, which are short and widely separated; surface coarsely sparsely punctate, and sparsely clothed with short recumbent cinereous pubescence; mandibles black; palpi brownish yellow; eyes large and deeply emarginate, the lower lobes rounded and strongly convex, the upper lobes rather large, close together; and separated from each other on the top by one-fifth the distance that separates the lower lobes on the front. Antennæ slender (last four joints missing), dark brown, sparsely clothed with short inconspicuous pubescence, and sparsely ciliate on underside with longer hairs; first joint extending to about middle of pronotum, rather robust and subcylindrical; third joint not quite twice as long as first joint, and subequal in length to fourth. Pronotum quadrate, base and apex about equal in width; sides feebly arcuately rounded, more strongly narrowed near base, and with a small slender acute tooth placed at basal third; surface moderately convex, without transverse depressions, coarsely densely punctate, and sparsely clothed with short recumbent silvery white pubescence. Scutellum somewhat triangular and broadly rounded posteriorly. Elytra slightly wider than pronotum, and moderately convex; sides parallel to apical third, then arcuately attenuate to the tips, which are separately narrowly rounded; surface densely, coarsely, and irregularly punctate, sparsely clothed with inconspicuous brown pubescence, and rather densely variegated with moderately long recumbent silvery white pubescence, which forms a more or less distinct transverse fascia at middle and apical third, between which is a dark brown area extending from lateral margins to near suture. Beneath sparsely coarsely punctate, and sparsely clothed with moderately long recumbent cinereous pubescence; last abdominal segment broadly rounded at apex.

Length, 3.25 millimeters; width, 1.2.

*Type locality.*—Surigao, Mindanao, Philippines.

Type in United States National Museum.

Described from a single example (sex undetermined), collected at the type locality.

**Sciades sibuyanensis** sp. nov.

Head and pronotum dark reddish brown; elytra brownish black, basal half of disk light reddish brown, and ornamented with irregularly shaped cinereous pubescent markings; beneath reddish brown, with a slight yellowish tinge on the legs.

Head distinctly transverse and feebly convex in front, scarcely wider than pronotum at apex, broadly concave between the antennal tubercles, which are rather short and widely separated; surface coarsely but not very densely punctate, and rather densely clothed with moderately long recumbent cinereous pubescence;

mandibles reddish brown, the tips black; palpi brownish yellow; eyes moderately large and deeply emarginate, the lower lobes slightly longer than wide and strongly convex, the upper lobes rather narrow and separated from each other on the top by nearly half the distance that separates the lower lobes on the front. Antennæ slightly longer than body, rather robust, reddish brown, with joints 4 to 10 slightly paler at base, sparsely clothed with short recumbent pubescence, and sparsely ciliate on underside with longer hairs; first joint short, extending only slightly beyond anterior margin of pronotum, rather robust and subfusiform; third joint subequal in length to first and fourth joints, the following joints shorter and gradually diminishing in length. Pronotum slightly wider than long, base and apex about equal in width; sides feebly arcuately rounded, more strongly narrowed near base, and with a small slender acute tooth placed at basal third; surface moderately convex, without transverse depressions, sparsely coarsely punctate, and densely clothed with moderately long recumbent cinereous pubescence, the pubescence evenly distributed, except for an oblong spot on each side of middle where the pubescence is brownish. Scutellum rather broadly rounded posteriorly. Elytra distinctly wider than pronotum and moderately convex; sides nearly parallel to apical fourth, then strongly arcuately attenuate to the tips, which are separately narrowly rounded; surface densely, coarsely, and irregularly punctate, sparsely clothed with short inconspicuous pubescence, each elytron ornamented with irregularly shaped cinereous pubescent spots over the entire surface, with the exception of a small area at scutellum extending backward along suture, and a broad transverse brown fascia situated slightly behind the middle and extending from lateral margin to near suture. Beneath densely, finely, and obsoletely rugose, with a few rather coarse punctures intermixed, rather densely clothed with moderately long recumbent cinereous pubescence; last abdominal segment subtruncate at apex, with a narrow transverse groove along apical margin, in front of which the surface is broadly but not deeply depressed.

Length, 4.3 millimeters; width, 1.6.

*Type locality*.—Sibuyan Island, Philippines.

Type in United States National Museum.

Described from a unique example, probably a female, collected at the type locality.

This species is not entirely congeneric, and seems to be more or less intermediate between *Sciades* and *Exocentrus;* it is nearer to the species of the latter genus which have the pronotum scarcely wider than long and the lateral spines on the pronotum very small, as in *moerens* Pascoe. It differs from *Sciades* in having the antennæ more robust and the first, third, and fourth joints subequal in length. From *Exocentrus* it is at once separated by the absence of the long erect stiff hairs on the body and antennæ. It seems advisable to retain the species in the genus *Sciades* temporarily until more material is available for study.

**Camptomyne philippinus** sp. nov.

*Male.*—Head, pronotum, and scutellum reddish yellow; elytra violaceous black and strongly shining; beneath dark brown, the median parts more or less reddish yellow.

Head slightly transverse and nearly flat in front, wider than pronotum at apex, flat between the antennal tubercles, which are very short and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, finely densely granulose, the granules distinctly separated, sparsely clothed with inconspicuous semierect pubescence and with numerous long erect black hairs intermixed; mandibles reddish yellow, the tips black; palpi dark brown, the tips paler; eyes large and very deeply emarginate, the lower lobes longer than wide and strongly convex, the upper lobes small and separated from each other on the top by not quite one-fourth the distance that separates the lower lobes on the front. Antennæ slightly longer than body, rather robust, uniformly dark brown, sparsely clothed with short inconspicuous pubescence, with numerous long erect black hairs intermixed; first joint scarcely extending to middle of pronotum, rather robust and subfusiform; third joint two-thirds as long as first joint and subequal in length to fourth. Pronotum slightly wider than long, base and apex about equal in width; sides feebly obliquely expanded from apical angles to a short slender tooth placed slightly behind middle, then strongly arcuately narrowed to base, the tooth acute at apex, and extending obliquely backward; surface feebly convex, with a broad obsolete transverse depression near anterior and posterior margins, densely finely granulose, sparsely clothed with inconspicuous pubescence, and with a few long erect black hairs intermixed. Scutellum small and broadly rounded behind. Elytra distinctly wider than pronotum at middle and moderately convex; sides parallel to apical third, then arcuately attenuate to the tips, which are separately narrowly rounded; surface coarsely densely punctate, the punctures irregularly placed at base and along suture and lateral margins, but more or less arranged in rows on middle of disk, sparsely clothed with moderately long semierect cinereous pubescence, and with numerous long erect stiff black hairs intermixed. Beneath densely obsoletely punctate, sparsely clothed with recumbent cinereous pubescence, which is denser and longer along the anterior margin of the abdominal segments, and with numerous long erect black hairs intermixed on the legs; abdominal segments with an obsolete depression on each side, the last segment subtruncate at apex.

*Female.*—Similar to male, but the antennæ slightly shorter, and the last abdominal segment truncate at apex, with a small triangular emargination at middle, transversely narrowly grooved along apical margin, obsoletely depressed in front of the groove, and with a narrow longitudinal median carina.

Length, 3 to 4 millimeters; width, 1.25 to 1.75.

*Type locality.*—Mount Banahao, Luzon, Philippines.

*Other locality.*—Northwestern Panay, Philippines.

Type, allotype, and paratype in United States National Museum; paratypes in collection of C. F. Baker.

Described from five specimens. Type, allotype, and two male paratypes from the type locality (*Baker 6051, 13501*) and one male paratype from Panay. One paratype (*Baker 6051*) is considerably paler than the type, but this is due to its being an immature specimen.

This species is very closely allied to *callioides* Pascoe but, according to the description given for that species, differs from it in having the head wider than the pronotum, the last two joints of the tarsi not yellow, and other minor details.

**Camptomyne philippinus var. unicolor var. nov.**

*Female.*—Above uniformly yellowish brown and feebly shining; beneath similar to the species except the tibiæ, which are darker brown. Eyes separated from each other on the top by one-third the distance that separates the lower lobes on the front. Antennæ about as long as body.

Length, 4.5 millimeters; width, 1.75.

*Type locality.*—Davao, Mindanao, Philippines.

Type in United States National Museum.

Described from a single female collected at the type locality.

This specimen is fully matured, and shows no trace of the violaceous color found in immature specimens of *philippinus.*

Since it does not differ from the species in any important structural characters, I am simply considering it as a color variety.

**Camptomyne insularis** sp. nov.

*Female.*—Closely allied to *philippinus* sp. nov. but differing from it as follows: Body broader in relation to its length; head, pronotum, and scutellum brownish yellow; elytra brownish black, moderately shining, the cinereous pubescence arranged in more or less broken longitudinal rows; antennæ shorter than body; beneath dark brown, with the median parts yellowish.

Length, 3.5 millimeters; width 1.75.

*Type locality.*—Sibuyan Island, Philippines.

Type in United States National Museum.

Described from a single female collected at the type locality.

### Genus LANGURIOMORPHA novum

Head not retractile, transverse, moderately convex in front, slightly wider than pronotum, and deeply concave between the antennal tubercles, which are rather strongly developed and widely separated. Eyes divided (lobes connected by a narrow black band without facets) and widely separated on the top. Antennæ robust, 11-jointed, about as long as body, and clothed on underside with long stiff hairs; first joint moderately long, not cicatricose at apex, pedunculate, straight, and extending to about middle of pronotum; third joint shorter than first joint. Pronotum subcylindrical, armed at sides with a distinct tooth, disk unarmed and with transverse grooves. Elytra elongate, unarmed at base, and clothed with long erect stiff hairs. Legs moderately long; femora rather strongly clavate, and unarmed at tips; anterior tibiæ slightly arcuate, middle and posterior tibiæ straight and deeply emarginate on outer margin near apex; tarsi rather short, narrow, fourth joint about equal in length to joints 1 to 3 united; tarsal claws divaricate.

Genotype, *Languriomorpha bicolor* sp. nov.

This genus belongs to the tribe Acanthocinini, and is allied to *Phlyarus* Pascoe and *Camptomyne* Pascoe. From the former it differs in not having the elytra costate, and from *Camptomyne* by having two distinct sulci along the anterior and posterior margins of the pronotum. It can also be separated from both these genera by having the first antennal joint pedunculate. It also resembles *Oloessa* Pascoe in having the eyes divided and the first antennal joint pedunculate, but differs from it in having the pronotum armed at sides and the elytra unarmed at base. Superficially it resembles some of the beetles of the genus *Languria*, of the family Erotylidæ.

**Languriomorpha bicolor sp. nov.**

*Female.*—Elongate, subcylindrical, and shining; head and pronotum reddish brown; elytra dark bluish green; beneath reddish brown, abdomen more yellowish, legs dark brown, base of femora reddish yellow.

Head with an obsolete longitudinal groove extending from occiput to epistoma, the surface obsoletely punctate, very sparsely clothed with exceedingly short inconspicuous pubescence, and with a few long erect black hairs along eyes and behind epistoma; mandibles reddish brown, the tips black; palpi brownish yellow; eyes rather small, the lower lobes rounded and strongly convex, the upper lobes narrow and separated from each other on the top by half the distance that separates the lower lobes on the front. Antennæ reddish black; base of joints (except the first two) reddish yellow, sparsely clothed with short inconspicuous pubescence, and with long erect black hairs on underside of joints; first joint abruptly expanded at apex, but the swollen part somewhat flattened on underside; third joint slightly shorter than first joint, and only obsoletely shorter than fourth; following joints nearly subequal in length, and about two-thirds as long as fourth. Pronotum slightly longer than wide, apex and base equal in width; sides nearly parallel, feebly constricted near anterior and posterior angles, with a rather long slender tooth slightly behind middle, the tooth acute at tip and bent upward; surface moderately convex, with two narrow transverse grooves along anterior and posterior margins, smooth and glabrous, except for a few long erect hairs. Scutellum somewhat triangular, narrowly rounded at apex. Elytra distinctly wider than pronotum and obsoletely depressed on basal half; sides parallel to middle, then feebly arcuately attenuate to the tips, which are separately narrowly rounded; surface smooth, sparsely clothed with inconspicuous recumbent cinereous pubescence, and with rows of regularly placed long erect hairs. Beneath densely obsoletely punctate, rather densely clothed with short recumbent yellowish pubescence, and with a few longer erect hairs on the last three abdominal segments; last abdominal segment broadly rounded at apex.

Length, 4.75 millimeters; width, 1.4.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum.

Described from a single female collected at the type locality.

**Emeopedus longicornis** sp. nov.

*Male.*—Elongate, rather broad, and strongly depressed above; uniformly brownish black above, rather densely clothed with short recumbent brown pubescence and variegated with cinereous hairs; beneath brownish black, the abdomen reddish brown, the posterior margin of the segments yellowish.

Head quadrate and strongly convex in front, as wide as pronotum, strongly concave between the antennal tubercles, which are moderately long and widely separated; surface with a narrow longitudinal groove extending from occiput to epistoma, not distinctly punctate, and sparsely clothed with short recumbent cinereous pubescence; mandibles black; palpi brownish black; eyes rather large and very deeply emarginate, the lower lobes rounded and strongly convex, and the upper lobes narrow and widely separated on the top. Antennæ one and one-half times as long as body, slender, and sparsely clothed with short inconspicuous pubescence; first joint cylindrical, extending to basal third of pronotum, and three-fourths as long as third joint, which is subequal in length to fourth. Pronotum slightly wider than long, slightly narrower at base than apex, and widest at apical third; sides unarmed, arcuately rounded anteriorly, and more attenuate toward base; base and anterior margin transversely truncate; surface regularly convex, and rather densely coarsely punctate. Scutellum broadly rounded behind. Elytra distinctly wider than pronotum, sides parallel to near apical fourth, then arcuately attenuate to the tips, which are separately broadly rounded; surface coarsely densely punctate, the punctures denser and more irregularly placed in basal region, forming distinct rows toward sides and becoming more obsolete toward apex, the cinereous pubescence forming on each elytron a more or less distinct broad spot at basal fourth and a narrow zigzag fascia at apical fourth, behind which the surface is distinctly variegated. Beneath obsoletely punctate and sparsely clothed with short recumbent cinereous pubescence; last abdominal segment broadly subtruncate at apex; tibiæ nearly straight, the middle pair distinctly emarginate on outer margin.

Length, 4 millimeters; width, 1.5.

*Type locality.*—Sandakan, Borneo.

Type in United States National Museum; paratype in collection of C. F. Baker.

Described from two males collected at the type locality (*Baker 13506*).

# DEUX MELASIDÆ NOUVEAUX DES PHILIPPINES

Par Ed. Fleutiaux

*Nogent-sur-Marne, France*

**Bothrion praeustum** sp. nov.

5 millimètres. Allongé, convexe, atténué. Dessus jaune-rougeâtre sur la moitié antérieure, noir sur la partie postérieure des élytres; pubescence de la couleur du fond. Tête convexe; ponctuation ombiliquée serrée. Antennes à deux premiers articles jaunes, les autres noirâtres; longuement pectinées à partie du 3ᵉ. Pronotum plus long que large, peu rétréci en avant, arrondi sur les côtés, regulièrement convexe; ponctuation ombiliquée serrée. Ecusson triangulaire, ponctué. Elytres atténués, striés-ponctués; interstries à ponctuation assez grosse. Dessous jaune. Sillons antennaires larges, profonds et lisses, à aretes vives. Fossette prosternale nette et profonde. Pattes jaune clair.

Ile Sibuyan (*Baker*).

Trés jolie espèce. Differe de *B. bakeri*, par sa forme atténuée en avant et en arriére; par sa couleur, et par la fossette prosternale plus grande.

**Scython insulcatus** sp. nov.

9.5 millimètres. Oblong, convexe. Dessus jaune-rougeâtre, avec la tête une tache en avant du pronotum et l'écusson noirs; pubescence jaune, obscure sur les parties noirs. Tête convexe, finement et peu densément ponctuée, impressionée en avant; base de l'epistom subégal à la crete sur antennaire, impressionée au milieu, bord antérieure sinué. Antennes noirs et longues, dépassant la moitié du corps, comprimis et fortement serriformes. Pronotum moins long que large, sinué sur les côtés, trés bombé, déprime à la base, ponctué comme la tête. Elytres graduellement arrondis latéralement, terminés par une épine, finement, éparsément et irregulierément ponctués, striés-sillonnés. Dessous noir; tout le propectus jaune, sauf le tour des hanches antérieures. Sillons antennaires nuls. Métasternum et abdomen finement pointillés; pubescence fine, grisâtre. Fémurs noirâtres; tibias plus ou moins rougeâtres; tarses plus clairs.

Ile Sibuyan (*Baker*).

Voisin de *S. nigriventris* Bonvouloir: moins robuste; ponctuation fine et espacée; une tache noir en avant du pronotum, jusque sur la bord antérieure; élytres entierèment jaunes.

Cette espèce est particulierèment curieuse par l'absence de sillons antennaires comme chez les Melasinæ; elle constitue sous ce rapport, avec certains *Plesiofornax* de Madagascar, une exception remarquable chez les Eucneminæ.

# NOTES ON JAPANESE LEPIDOPTERA AND THEIR LARVÆ: PART IX

By A. E. WILEMAN

*Fellow of the Entomological Society of London*

ONE COLORED PLATE

## HETEROCERA

## GEOMETRIDÆ

### BOARMIANÆ

### Genus EUCTENURAPTERYX Warren

*Euctenurapteryx* WARREN, Novit. Zool. 1 (1894) 399.

**Euctenurapteryx maculicaudaria** Motschulsky.

Plate 1, fig. 1, larva; fig. 2, food plant.

Japanese name, *shirotsubame-edashaku, kiracho, ingaya no shakutorichō.*

*Acæna maculicaudaria* MOTSCHULSKY, Bull. Soc. Nat. Mosc. 1 (1866) 196; (*Urapteryx*) PRYER, Trans. Asiat. Soc. Japan 12 (1884) 59; (*Euctenurapteryx*) LEECH, Ann. & Mag. Nat. Hist. VI 19 (1897) 193; (*Ourapteryx*) MATSUMURA, Cat. Insect. Jap. 1 (1905) 149, No. 1278; Thousand Insects of Japan (Zoku Nihon Senchū Zukai (Jap.) (1910) suppl. 2, 73, No. 383, pl. 23, fig. 8, ♀; (*Urapteryx*) NAGANO, Nawa's Insect World [Konchū Sekai (Jap.)] 14 (1910) 92, pl. 5, figs. 1–11, larva, pupa, imago ♂; SASAKI, Nihon Jūmoku Gaichūhen (Jap.) ed. 3 (1910) pt. 2, 9, pl. 80, larva, imago ♂.

*Urapteryx luteiceps* FELDER and ROGENHOFER, Reise Novara Lep. 5 (1875) pl. 122, fig. 2; STAUDINGER, Iris 10 (1897) 36; STAUDINGER and REBEL, Cat. Lep. Pal. 1 (1901) 330, No. 3758.

The larva figured (Plate 1, fig. 1) was taken in May, 1901 (figured, May 31), on *inu-gaya* (*Cephalotaxus drupacea* Siebold and Zuccarini), at Yoshino, Yamato Province, Honshu. A male imago of *E. maculicaudaria* Motschulsky emerged from the pupa resulting from this larva on June 16, 1901. Three male and two female imagoes also emerged from similar larvæ taken at the same time and place. The pupa is inclosed in a frail, white cocoon. I describe the larva from my artist's original figure as follows:

*Larva.*—Length, 67 millimeters. Head greenish yellow, with two, slender, black streaks on each side. Color light green. A white, longitudinal, subdorsal stripe edged above and below with a slender, black line, the upper line ends at segment 13, the lower line curves down to the anal segment; above the upper black line is another, extending from segment 13 to the center of segment 9 where it apparently ceases. A spiracular white stripe, not edged with black lines, ending on anal segment; below this there is a black, slender, longitudinal, subspiracular line extending from the leg on segment 4 to the center of segment 11; legs black; prolegs and claspers light reddish brown; spiracles white, ringed with brown exteriorly.

Nagano[1] gives a life history of *E. maculicaudaria* Motschulsky, which I have translated into English, accompanied by figures and descriptions of the larva, pupa, and imago. He says:

> A larva taken at Gifu, Mino Province, in April, 1909, on ara-kashi [*Quercus glauca* Thunberg], spun its cocoon on May 10 and turned into a pupa on May 13. The imago emerged on May 29. Another larva taken at the end of April, 1909, on sangoju [*Viburnum odoratissimum* Ker.], pupated on May 3 and the imago emerged on May 19. An examination of the dates on which this moth is captured shows that it is also taken at Gifu in the middle of October and there are therefore probably two broods of the species in the year. It is not yet ascertained in which stage it passes the winter. The food plants are various species of kashi [evergreen oak]; enishida [*Cytisus scoparius* Link]; sangoju.

Nagano describes the larva as follows:

> Body ashy brown sprinkled with minute black specks, it closely resembles a withered twig. On each side of the head there is a black spot, on the anterior area of segment 3 to which one pair of thoracic legs is attached, there is a subdorsal wart, or projection. The shape of the larva exactly resembles that of a withered twig; there is a wart on segment 5 situated posteriorly and laterally; there are also some warts on the posterior part of each segment; the mediodorsal line is marked with spots shaped like a stirrup; on segment 3 there is a conspicuous, half-moon-shaped, white, mediodorsal spot; laterally some ridged warts or projections; each segment with horizontal skin folds; the abdominal legs adjoin the claspers, are basally ridged with black and have a few hairs; ventrally tinged with white; the supraventral line generally sparsely sprinkled with black dots; spiracles encircled with black; length 2 sun [about 66 millimeters].

Sasaki[2] gives figures and descriptions of the larva and male imago of *maculicaudaria*. He names the imago *kirachō* and *inugaya no shakutor-ichō* (the *inu-gaya* geometer). He says that—

---

[1] Nawa's Insect World (Knochū Sekai) 14 (1910) 92, pl. 5, figs. 1–11.

[2] Nihon Jūmoku Gaichūhen (Jap.) ed. 3 (1910) pt. 2, 9, pl. 80, larva, imago ♂.

> The larva appears in May and feeds upon the *inu-gaya* (*Cephalotaxus drupacea* Siebold and Zuccarini) which also goes by the names of *hebodebo; hibi-gaya*. It is full grown between the end of May and the commencement of June and forms a cocoon of leaves rolled together. The imago emerges in the middle of June. The full-grown larva is green; length 1 sun [Japanese inch] 7 or 8 bu [about 56.1 to 59.4 millimeters]; dorsally of a light, bright color; ventrally dark colored; it is not easy to find as the color of the body resembles so closely the leaves of the *inu-gaya;* mandibles, thoracic and abdominal legs are all dark brown and there is a patch of the same color on the anal segment. The abdominal legs are attached to segments 9 and 12.

Judging from the descriptions of the larva of *maculicaudaria* Motschulsky given by Nagano and Sasaki, there are apparently two forms.

The form described by Nagano is "ashy brown, sprinkled with minute black specks;" it appears in April, feeds upon *Quercus, Viburnum,* and *Cytisus,* and the imago emerges in May. The form described by Sasaki is green, it appears in May and June, feeds upon *Cephalotaxus,* and the imago emerges in the middle of June. The larva figured by me agrees in color with the form figured and described by Sasaki. It was also taken on *Cephalotaxus drupacea* Siebold and Zuccarini in May, and the imago emerged in the middle of June. As remarked by Sasaki, the larva "is not easy to find as the color of its body resembles so closely the leaves of the *inu-gaya* [*Cephalotaxus*]." It is an example of procryptic colors[3] affording a general protective resemblance which Poulton defines as "concealment as a protection against enemies effected by colors which harmonize with the total artistic effects of the immediate environment."

Leech[4] remarks:

> Among the species in Pryer's collection is a remarkable female aberration from Yokohama, in which the usual white colour is replaced by pale greyish brown; the transverse lines are, in consequence of the ground-colour, indistinct, but they are more ferruginous in colour as also are the fringes and spots at angle of the secondaries.

This specimen, alluded to by Leech, and also by Pryor, is now in the British Museum collection.

*Local distribution.*—Honshu, Musashi Province, Yokohama (*Pryer*): Tokyo, September (*Wileman*): Shinano Province, Oiwake (*Pryer*): Echizen Province, Tsuruga (*Leech*): Sagami

---

[3] Vide Wileman, Philip. Journ. Sci. § D 9 (1914) table 1, facing page 248.

[4] Ann. & Mag. Nat. Hist. VI 19 (1897) 193.

Province, Hakone, June (*Wileman*): Yamato Province, Yoshino, June, August, September (*Wileman*). Hokkaido, Oshima Province, Hakodate, August (*Leech*). Matsumura records the species from Hokkaido and Honshu.

*Time of appearance.*—Larva, April to June; imago, May, June, July?, August, September, October; double-brooded?

*General distribution.*—Eastern China; Japan (*Leech*). Korea; Manchuria; eastern Siberia, Ussuri (*Matsumura*).

### Genus CROCALLIS Treitschke

*Crocallis* TREITSCHKE, Eur. Schmett. VI 1 (1827) 151.

**Crocallis obliquaria** Moore.

Plate 1, figs. 3 and 4, larva, light form, lateral and dorsal aspects; figs. 5 and 6, larva, dark form, lateral and dorsal aspects; fig. 7, food plant. Larva of forma *arida* Butler.

Japanese name, *eguritsuma-edashaku*.

*Crocallis obliquaria* MOORE, Proc. Zool. Soc. London (1867) 622; HAMPSON, Moths India 3 (1895) 232, fig. 125, ♂; (*Gonodontis*) STAUDINGER and REBEL, Cat. Lep. Pal. 1 (1901) 329, No. 3745; MATSUMURA, Cat. Insect. Jap. 1 (1905) 148, No. 1267; Thousand Insects of Japan [Zoku Nihon Senchū Zukai (Jap.)] suppl. 2, 87, No. 408, pl. 24, fig. 18, ♀.

*Crocallis angularia* MOORE, Proc. Zool. Soc. London (1867) 622.

*Crocallis bivittaria* MOORE, Proc. Zool. Soc. London (1867) 622.

*Niphonissa arida* BUTLER, Ann. & Mag. Nat. Hist. V 1 (1878) 394; Ill. Typ. Lep. Het. 3 (1879) 31, pl. 48, fig. 7, ♂; PRYER, Trans. Asiat. Soc. Japan 12 (1884) 60, No. 287; (*Crocallis*) LEECH, Ann. & Mag. Nat. Hist. VI 19 (1897) 222.

*Crocallis bilinearia* SWINHOE, Proc. Zool. Soc. London (1889) 423.

*Crocallis heydena* SWINHOE, Trans. Ent. Soc. London (1894) 203.

There are two forms of the larva, one light in color, the other dark.

*Form 1 (light form).*—Plate 1, figs. 3 and 4. The larva figured was taken in December, 1900 (figured, December 4), at Kobe, Settsu Province, Honshu, on carrot, Japanese name *ninjin* (*Daucus carota* Linnæus). From this form I reared two male imagoes of *arida* Butler on April 10 and 15, 1901.

*Form 2 (dark form).*—Plate 1, figs. 5 and 6. I have bred imagoes of *arida* from this form of the larva taken at Kobe which also feeds upon carrot.

I describe form 1 and form 2 of the larva from my artist's original figures as follows:

*Form 1.*—Length, 66 millimeters. Color laterally light ashy gray with a broad, blackish brown, mediodorsal stripe, attenuated at each segmental suture and broadened out to an angle at the center of each segment; slightly darker, paired, longitudinal, faint mediolateral lines; spiracles ashy gray encircled with black; all legs, prolegs, and claspers light ashy gray; ventrum dark; segment 13 is slightly humped.

*Form 2.*—Length, 66 millimeters. Color much darker, especially laterally; mediodorsal stripe not so clear and conspicuous.

*Imago.*—Hampson[5] remarks:

> * * * the outer margin may be hardly crenulate or strongly toothed; the ground-color much yellower with fuscous blotches; the antemedial line may be prominent or entirely obsolete and in typical *obliquaria* the postmedial line of the fore wing is straight and oblique from near the apex.

*Crocallis obliquaria* and *arida* are the only forms of this species found in Japan. The imago is to be taken in the winter months from November to March by beating the withered leaves still clinging to the two species of dwarf oaks, *ko-nara* (*Quercus glandulifera* Blume) and *kunugi* (*Quercus serrata* Thunberg).

I am inclined to think that carrot is not the true food plant of this species, but that it probably feeds upon dwarf oak in spring and summer. My larvæ were taken in December when the oak leaves have all withered and are still clinging in some numbers to the trees. The hibernating larvæ, therefore, would naturally be obliged to seek for low-growing plants as, at this time of the year, the leaves of not only the oaks but of all other trees, with the exception of the nondeciduous ones and conifers, have all withered and fallen. The type of *C. arida*, from Yokohama (*Jonas*), is in the British Museum collection.

*Local distribution.*—Honshu, Musashi Province, Yokohama (*Pryer*): Tokyo, September, October (*Wileman*): Shinano Province, Oiwake (*Leech*): Karuizawa, August (*Wileman*): Shimotsuke Province, Nikko, September (*Leech*): Yamato Province, Yoshino, September, October (*Wileman*): Settsu Province, Kobe, April, bred (*Wileman*). Hokkaido, Oshima Province, Hakodate, May (*Wileman*). Matsumura records the species from Honshu only.

*Time of appearance.*—Larva, November and December; imago, April, May, August to March. Probably two or perhaps three broods of the imago in the year.

*General distribution.*—India (northwestern Himalayas, Khasis); Japan (*Hampson*). Western China (*Leech*). Manchuria (*Matsumura*).

---

[5] Moths India 3 (1895) 232.

## Genus PERCNIA Guénée

*Percnia* GUÉNÉE, Phal. 2 (1857) 216.

**Percnia giraffata** Guénée.

Plate 1, fig. 8, larva.

Japanese names, *ō-gomadara-edashaku*[6] and *mamushi-bori.*

*Abraxas giraffata* GUÉNÉE, Phal. 2 (1857) 205; (*Percnia*) PRYER, Trans. Asiat. Soc. Japan 12 (1884) 72, No. 495; HAMPSON, Moths India 3 (1895) 309; LEECH, Ann. & Mag. Nat. Hist. VI 19 (1897) 456; MATSUMURA, Cat. Insect. Jap. 1 (1905) 142, No. 1218; MUKAIGAWA and NAGANO, Nawa's Insect World [Konchū Sekai (Jap.)] 15 (1911) 50, pl. 4, figs. 1–6, ova, larva, pupa, imago.

*Rhyparia grandaria* FELDER, Wien. Ent. Mo. (1862) 39; FELDER and ROGENHOFER, Reise Novara 5 (1875) pl. 129, fig. 28.

The larva figured (Plate 1, fig. 8) was taken in July, 1901 (figured, July 20), at Yoshino, Yamato Province, Honshu, on persimmon, Japanese name *kaki* (*Diospyros kaki* Linnæus). A female imago of *giraffata* Guénée emerged from the pupa resulting from this larva on July 29, 1901. I describe the larva of *giraffata* from my artist's original figure as follows:

*Larva.*—Length, about 65 millimeters. Head yellowish, speckled with minute white points, slightly hairy. Color light purplish gray. A conspicuous purplish black dorsal and subdorsal eyelike ocellus on each side of segment 4 (counting head as segment 1); this ocellus is intersected subdorsally by a yellowish, half-moon-shaped streak; an irregular lateral series of purplish black, slender lines, some longitudinal, others irregularly curved; a longitudinal, ochraceous brown, subspiracular stripe dotted with minute white specks; legs light ochraceous, with three black spots; prolegs, claspers, and anal flap ochraceous brown; spiracles purplish gray, ringed with black exteriorly. Mukaigawa[7] gives a description of the larva of *Percnia giraffata* Guénée, accompanied by figures of the ova, larva, pupa, and imago drawn by Nagano. He says that—

> The larva resembles a mamushi [Japanese viper], and it feeds upon kaki [persimmon, *Diospyros kaki* Linnæus]. It hangs down by a thread when alarmed and enters the earth in order to pupate. There are two broods in the year. Imagoes taken between the end of May and the commencement of June laid their eggs on the surface of persimmon leaves and hatched after the expiration of about two weeks. They entered the

---

[6] Matsumura also gives the name *ō-gomadara-edashaku* to *Percnia felinaria* Guénée var. *formosana* Matsumura, Zoku Nihon Senchū Zukai (1910) suppl. 2, 112, No. 451, pl. 26, fig. 8, ♂.

[7] Nawa's Insect World (Konchū Sekai) 15 (1911) 50, pl. 4, figs. 1–6, ova, larva, pupa, imago.

earth between the commencement and middle of July and pupated. The imagoes emerged at the end of July when they laid eggs. These eggs hatched in three or four days and the larvæ were full-grown by the commencement and middle of September when they entered the earth and pupated. They passed the winter in the pupal stage and the imagoes emerged in the following year.

Mukaigawa describes the larva as follows:

> When full grown it measures in length 1 sun [Japanese inch], 8 or 9 bu [59.4 to 62 millimeters]. Head reddish brown, sprinkled with yellowish white specks; a broad, black, longitudinal, dorsal stripe; subdorsal stripe broadly yellowish brown, with irregular, slender, curved, blackish brown lines; laterally and ventrally black; ventrum medially light colored; laterally sprinkled with purplish white dots; a specially striking feature is that segments 3 and 4 are conspicuously enlarged; segment 3 has a dorsal and lateral black, elliptical spot and also another spot of the same color shaped like an eyebrow, both of which give the two spots an eyelike appearance; dorsally this eyelike spot is centered with black; a yellow spot connects both eye spots. The larva varies more or less as there are some of them which are entirely tinged with ashy, light green.

This larva is an example of the class of protective mimicry alluded to by Poulton under pseudaposematic colors.[8] He defines this as "an appearance which deceptively suggests something unpleasant or dangerous to an enemy." As has been observed by Mukaigawa, the larva has a certain resemblance to the *mamushi* (Japanese viper). This snakelike[9] resemblance of some larvæ has been referred to in the course of these papers in the cases of *Ophideres tyrannus* Guénée and *Theophila mandarina* Moore, which have terrifying eyelike spots; and of *Theophila falcigera* Butler, which suggests a cobralike serpent.

*Local distribution.*—Honshu, Fujisan (*Pryer*): Yamato Province, Yoshino, June, July (*Wileman*): Shimotsuke Province, Nikko, August (*Wileman*). Kyushu, Hyuga Province, Nakato, July (*Wileman*): Higo Province, Iidasan, May, June (*Wileman*). Very common at light at Yoshino.

*Time of appearance.*—Two broods in the year. The cycle of existence is approximately as follows: First brood: Ovum, May and June; larva, May, June, and July; pupa, July; imago, July and August. Second brood: Ovum, August; larva, September; pupa, September, October to May; imago, May and June.

*General distribution.*—Sikhim; Burma (*Hampson*). Japan, central and western China (*Leech*).

---

[8] Vide Wileman, Philip. Journ. Sci. § D 9 (1914) table 1, facing page 248.

[9] Philip. Journ. Sci. § D 10 (1915) 348–356.

## Genus ARICHANNA Moore

*Arichanna* MOORE, Proc. Zool. Soc. London (1867) 658.

### Arichanna fraterna Butler.

Plate 1, fig. 9, larva; fig. 10, food plant.

Japanese names, *kishita-edashaku*, *madara-kintabaga* (recte ? *kishitabaga*).

*Rhyparia fraterna* BUTLER, Ill. Typ. Lep. Het. 2 (1878) 53, pl. 37, fig. 9.

*Arichanna melanaria* LEECH (nec Linnæus), Ann. & Mag. Nat. Hist. VI 19 (1897) 436; STAUDINGER and REBEL, Cat. Lep. Pal. 1 (1901) 323, No. 3691 (part.); MATSUMURA, Cat. Insect. Jap. 1 (1905) 139, No. 1199 (part.); Thousand Insects of Japan [Zoku Nihon Senchū Zukai (Jap.)] (1910), suppl. 2, 114, No. 454, pl. 26, fig. 11, ♂ (part.); NAGANO, Nihon Rinshirui Hanron (Jap.) (1905) 231, pl. 10, fig. 12 (? part.); Nawa's Insect World [Konchū Sekai (Jap.)] 19 (1915) 226, pl. 11, larva, pupa, imago ♂ ♀ (part.); PROUT, Seitz's Macrolep. Faun. Pal. 4 (1914) 304, pl. 14, fig. *b*, ♂ (part.).

*Icterodes fraterna* PRYER, Trans. Asiat. Soc. Japan 12 (1884) 72.

The larva figured (Plate 1, fig. 9) was taken in April, 1901 (figured, April 30), at Nara, Yamato Province, on *basui-boku* (Latin name?). A female imago of *Arichanna fraterna* Butler emerged from the pupa resulting on May 23, 1901, and another male imago was bred on the same date from a larva taken at the same time and place.

The larvæ were very common, in a semigregarious state, at Nara in April, and the imago occurs there in abundance in May, when I beat it out of bushes in the woods in great numbers.

I have been unable to identify the Japanese name basui-boku, given to this shrub. It may be a name given locally at Nara. I believe that it is identical with *Pieris japonica* D. Don, known in Japan as *asebi* or *asebo*. *Pieris japonica* is given by Nagano as the food plant of *Arichanna melanaria* Linnæus[10] and *A. jaguararia* Guénée[11] so that the larvæ of these two species, which much resemble each other, apparently feed on the same food plant.

I describe the larva of *fraterna* Butler from my artist's original figure as follows:

*Larva.*—Length, about? 45 millimeters. Head ochraceous brown. Body light yellow, rather darker on the anal segment; a dark, longitudinal, mediodorsal line; a longitudinal, subdorsal series of minute black dots, two on each segment; an irregular series of mid-lateral, spiracular and subspiracular black dots; legs and prolegs light ochraceous brown.

---

[10] Nawa's Insect World (Konchū Sekai) 19 (1915) 226.

[11] Nawa's Insect World (Konchū Sekai) 17 (1913) 133.

*Arichanna fraterna* Butler has hitherto been regarded as a synonym of the European species *Arichanna melanaria* Linnæus and is so treated in Staudinger's catalogue and also by Leech [12] and by Nagano.[13] Butler in his description of *fraterna* [14] says:

> Closely allied to *R. melanaria* of Europe, but half as large again, the primaries with the series of black spots more crowded together, leaving broad white bands between the basal, central and submarginal series: secondaries with the spots larger and therefore forming three well-defined series in addition to the discocellular spot. Expanse of wings 2 inches 1 line. Yokohama (Jonas and Pryer).

In the national collection at the Natural History Museum, South Kensington, *Arichanna fraterna* Butler is separated from *A. melanaria* Linnæus and is given specific rank. Of the former species there is a series of six males and five females, all of which come from various localities in Japan; namely, Oiwake, Hakone, Tokyo, and Yokohama. The series of *melanaria* consists of eleven males and six females, all European specimens. The series of these two species show the following differences:

Butler observes in his description of the male type, which probably was the only specimen he had before him, that *fraterna* is "half as large again" as *melanaria*. In Table 1 are recorded measurements taken from the series of the two species, showing the expanse of their wings.

TABLE 1.—*Expanse of wings of Arichanna fraterna and A. melanaria.*

| Species. | Sex. | Maximum expanse. | Minimum expanse. |
|---|---|---|---|
| | | *mm.* | *mm.* |
| *Arichanna fraterna* | Male | 58 | 44 |
| Do | Female | 56 | 46 |
| *Arichanna melanaria* | Male | 48 | 42 |
| Do | Female | 50 | 42 |

*Antennæ.*—The antennæ of *fraterna* seem to be of a stouter build than those of *melanaria* in which the pectinations are slenderer.

*Markings.*—*Arichanna fraterna* has the general appearance of being more conspicuously and heavily marked than *melana-*

---

[12] Ann. & Mag. Nat. Hist. VI 19 (1897) 436.

[13] Nawa's Insect World (Konchū Sekai) 19 (1915) 226.

[14] *Rhyparia fraterna*, Ill. Typ. Lep. Het. 2 (1878) 53, pl. 37, fig. 9.

*ria*. In *fraterna*, as Butler observes, the black spots of the forewings are more "crowded together," and they are also partially coalescent which is not the case in *melanaria;* in *melanaria* also these black spots are decidedly smaller. On the hind wings the maculation of *fraterna* is more or less connected, forming bands, in some cases very decided ones, whilst in *melanaria* the maculation is, as a rule, well separated. One female specimen of *fraterna* from Yokohama seems to come nearer to *melanaria* from Europe than any of the ten other specimens of the series and the maculation of both fore and hind wings more resembles that of *melanaria.*

Nagano gives an account of the life history of *Arichanna melanaria,* in the bibliography of which he includes *Icterodes fraterna* as a synonym. He doubtless refers to *Rhyparia fraterna* Butler. I am unable to say whether typical *melanaria* is taken in Japan, but am content to separate the two species provisionally in accordance with the arrangement in the British Museum until European and Japanese lepidopterists have thoroughly examined their respective affinities. This may involve an examination of the genitalia of the two species. Meanwhile, with a view of providing some material for future investigation, I give a translation made by me of parts of Nagano's article on *melanaria,* including a description of the larva which, no doubt, refers to that of *fraterna* Butler; also translations from several German authors of descriptions of the larva of *melanaria.*

## DESCRIPTIONS FROM VARIOUS AUTHORS

### DESCRIPTION OF LARVA FROM NAGANO[15]

Head yellowish brown emitting yellowish white hairs; eyes black; dorsal region pale purplish white; ventrum and anal region light yellowish brown; the whole body marked longitudinally and transversely with black and with black dots; the dorsal line is double and is, more or less, marked with a series of dotted lines; the subdorsal line is also double and some black dots are present between its two lines, one or two on each segment, the lateral line is also double marked with a row of dots; spiracles dark, tinged with blackish green; black dots behind the spiracles and also a black dot beneath them; a row of dots near the subspiracular line and a row of black spots on the same line; a row of dots and spots also on the supraventral line; the ventral line is double and between its two lines the area is a light yellow but not on the last segment; a row of transverse black dots on segment 12; legs and prolegs are both yellow; when full grown the larva measures 9 bu [29.7 millimeters].

---

[15] Nawa's Insect World (Konchū Sekai) 19 (1915) 226.

This species [*Arichanna melanaria* Linnæus] is single-brooded and the time of its appearance and the conditions of its life history almost agree with those of the *hyōmon-edashaku* [*Arichanna jaguararia* Guénée]. The larva is found in March and feeds upon the leaves of the *asebi, Pieris japonica* [D. Don). In Europe it is said to feed upon *kurosume no ki, Vaccinium uliginosum* [Linnæus]). Both of these shrubs belong to the order of *Ericaceæ* and *V. uliginosum* also occurs in Japan. If, therefore, careful search were made it might be discovered that the larva feeds upon *V. uliginosum* in Japan also. Moreover, as several genera allied to these two shrubs are rather numerous in Japan it may probably happen to feed upon others on which one would never expect to find it. It usually pupates between the end of April and the commencement of May and the imago emerges between the end of May and the commencement of June. The larva of this species is decimated in surprising numbers by the attacks of parasitic flies, which is also the case as regards the *hyōmon-edashaku*. The annual cycle of its metamorphoses is not yet known but, as larvæ which have grown to about 3 bu [9.9 millimeters] in length may be seen at the end of March, I think that it probably hibernates in the larval stage.

### DESCRIPTION OF LARVA OF RHYPARIA MELANARIA FROM HOFMANN [16]

Larva 2.5 centimeters long, black with double, yellow, medial- and double, yellow collateral lines; on the fifth to the eighth segment the collateral lines are in many specimens quite, or almost quite, interrupted, thus producing large deep black spots on both sides of the medial line.—Cervical plate black, divided from the medial line edged broadly white in front. Head bright chestnut color, unmarked, narrower than the first segment slightly notched on the vertex. Anal flap obtusely triangular, black. Tubercles very small, not visible without magnification. Spiracular lines very broad, light yellow, traversed by two interrupted and waved, slender, black lines. Spiracles large, black, rusty yellow; on the three last segments, especially, very conspicuous spots and three large black dots surrounded by very small tubercles. Ventrum traversed by a broad, light yellow, medial line and on both sides by two side lines, of which the interior one is reddish yellow and broad, the exterior one pale yellow and slender; between the latter and the spiracular stripe another indistinct, interrupted, yellow, longitudinal line; all feet red-brown. Lives in May on the marsh bilberry (*Vaccinium uliginosum*) and pupates in the earth without spinning a cocoon into a brownish yellow pupa. (Wild. 378, pl. 10, fig. 4.) Emerges in July. Distributed in several regions of northern Germany, in the Alps, in southern France, Sweden, Lapland, Russia, and Siberia.

### DESCRIPTION OF LARVA OF ARICHANNA MELANARIA FROM REBEL [17]

The larva yellow, with numerous (8) waved black longitudinal lines, which thicken into stripes above the margin of the sides which are spotted with orange-yellow. Head and thoracic legs bright brown. Lives in May on the marsh bilberry (*Vaccinium uliginosum*). The pupa brownish yellow, with conical cremaster, which ends in two spines.

---

[16] Die Raupen der Grossen Schmetterlinge Europas (1893) 178, pl. 40, fig. 16*a*.

[17] Berge's Schmetterlingsbuch, ed. 9 (1910) 383, pl. 40, fig. 14, imago ♂ (no figure of larva).

### DESCRIPTION OF LARVA OF ARICHANNA MELANARIA FROM HOFMANN[18]

The larva, plate 40, fig. 16, with bright brown head, is yellow with numerous black, waved longitudinal lines, which thicken into stripes above the margin of the sides which is bright and spotted with orange-yellow. Lives in May on the marsh bilberry (*Vaccinium uliginosum*).

Nagano,[19] in his introductory remarks concerning *Arichanna melanaria* L., says that—

> * * * this species much resembles, both in form and habits, the closely allied species *Arichanna jaguararia* Guénée, the larva of which also feeds upon the same food plant as *melanaria;* namely, *Pieris japonica* D. Don, known in Japan as *asebi* or *asebo.*

This being so, I think that it may possibly be of some use for future investigation if I give here a translation of Nagano's description of the larva of *jaguararia* which, however, is a quite distinct species.

### LARVA OF ARICHANNA JAGUARARIA GUÉNÉE; JAPANESE NAME, HYŌMON-EDASHAKU

> Head yellowish brown emitting black hairs; eyes black; body yellow, slightly tinged with brown; dorsal line pale brown, indistinct; subdorsal line with a few, small, black dots on each segment; lateral line, with one or two black dots, or black spots, on each segment; the subspiracular line is also marked with one black dot on each segment; the size of these black dots, or spots, varies more or less according to the larva and sometimes they are absent; some larvæ also are well marked on the whole body with black spots whilst others are sparsely marked; spiracles black encircled with black; the supraventral line also has a small black dot on each segment; the spots on segments 4 and 5 are the largest, they are however sometimes indistinct; tips of thoracic legs dark brown; the base marked externally with a black spot; also the base of these legs is marked internally with a deep brown line; when full grown the larva attains a length of 1 sun [Japanese inch] and 2 bu [39.6 millimeters].
>
> * * * *jaguararia* has one brood in the year. The larva may be seen in March. It feeds upon *asebi* (*Pieris japonica* D. Don). It generally pupates at the commencement of May, and the imago emerges at the commencement of June. The larva is to be seen in great numbers from the middle to the end of April on the leaves of the *asebi.* A great number of them are subject to the attacks of a parasite and, therefore, very few of them reach the pupal stage, whilst those which attain the imago stage are still scarcer. The parasite lays its eggs on the external surface of the larva. These eggs are almost silvery white in color. They are sometimes deposited by the parasite at the anal extremity of the larva, but more generally on the thoracic segments. The larvæ examined

---

[18] Die Schmetterlinge Europas, ed. Spuler 2 (1903–1910) 87, pl. 58, fig. 31, imago ♂; 4 (1910) pl. 40, fig. 16*a*, larva, fig. 16*b*, pupa.

[19] Nawa's Insect World (Konchū Sekai) 17 (1913) 133, pl. 8 (larva, pupa, imago ♂).

by me were infested with at least one egg of the parasite and in many cases with five eggs. I have taken some scores of these larvæ annually for some years past and have reared them but they have all died, either previous to pupation or during the pupal stage, owing to the injury inflicted upon them by these parasites, and I have scarcely ever been able to obtain any imagoes from them. Dating from the year before last up to last year [1912] I have reared young larvæ which were not, so far, infested by the eggs of these parasites and have only succeeded in rearing one imago from the whole number. From this experience I have learned that the proportion of imagoes of this species which emerges from the larva probably does not exceed one in a hundred. The number of females bred is also much less in comparison with the number of males. As, for the foregoing reasons, I have never been able to obtain eggs, I have never been able to trace the life history satisfactorily. I had larvæ at the end of March which measured about 3 bu [9.9 millimeters] in length, and I infer from this that the species probably passes the winter in the larval stage. The pupal stage lasts from the beginning of May to the beginning of June; the imaginal stage, from the beginning of June to the middle of July.

*General distribution of Arichanna jaguararia.*—Japan (Honshu, Shikoku, Kyushu); central and northern China.

*Pupa of Arichanna fraterna Butler.*—Light shining brown, lighter in color on the wing cases.

*Imago.*—Leech remarks:

> *Fraterna*, Butl., is a pale form of *A. melanaria*, and is almost exactly identical with some European examples of the species in my collection. *Sordida*, Butl., is a dark form also agreeing with some European specimens, and *askoldinaria* is a form intermediate between the two. Alphéraky mentions a variety of the species from Peï-chouï (Rom. sur. Lép. vi. p. 55).

As previously remarked by me *Arichanna* (*Rhyparia*) *fraterna* Butler is now separated from *Arichanna melanaria* in the British Museum collection and is given specific rank. *Arichanna* (*Icterodes*) *sordida* Butler[20] is now included as a synonym in the series of *Arichanna* (*Rhyparia*) *askoldinaria* Oberthür,[21] which is also given specific rank.

The type of *Rhyparia askoldinaria* is from Korea. The type of *Icterodes sordida*, a female, is from western Korea.

*Local distribution of Arichanna fraterna.*—Honshu, Shinano Province, Oiwake (*Pryer*): Musashi Province, Yokohama (*Pryer*): Yamato Province, Yoshino and Nara, May, June (*Wileman*): Sagami Province, Hakone, June (*Wileman*): Shimotsuke Province, Nikko, July (*Wileman*): Mino Province Gifu (*Nawa*) (as *melanaria*). Very common at Yoshino and Nara, Yamato Province, in June. Matsumura records *mela-*

---

[20] *Icterodes sordida* Butler, Ann. & Mag. Nat. Hist. V 11 (1883) 116.

[21] *Rhyparia askoldinaria* Oberthür, Etud. d'Ent. 5 (1880) 52, pl. 9, fig. 11.

*naria* from Hokkaido, Honshu, and Kyushu, with *fraterna* as synonym. Nagano records *melanaria* from Shikoku with *fraterna* as synonym.

*Time of appearance.—Arichanna fraterna,* larva, April; imago, May to July.

*General distribution of Arichanna melanaria.*—Europe; Korea; eastern Siberia (Ussuri, Amurland, Askold) (*Leech*); Manchuria (*Matsumura*); China (*Alphéraky*).

*General distribution of Arichanna fraterna.*—Japan.

# ILLUSTRATIONS

[Drawings by Hisashi Kaidō.]

PLATE 1

FIGS. 1 and 2. *Euctenurapteryx maculicaudaria* Motschulsky. *1*, larva; *2*, food plant.

3 to 7. *Crocallis obliquaria* Moore forma *arida* Butler. *3* and *4*, larva, light form, lateral and dorsal aspects; *5* and *6*, larva, dark form, lateral and dorsal aspects; *7*, food plant.

FIG. 8. *Percnia giraffata* Guénée, larva.

FIGS. 9 and 10. *Arichanna fraterna* Butler. *9*, larva; *10*, food plant.

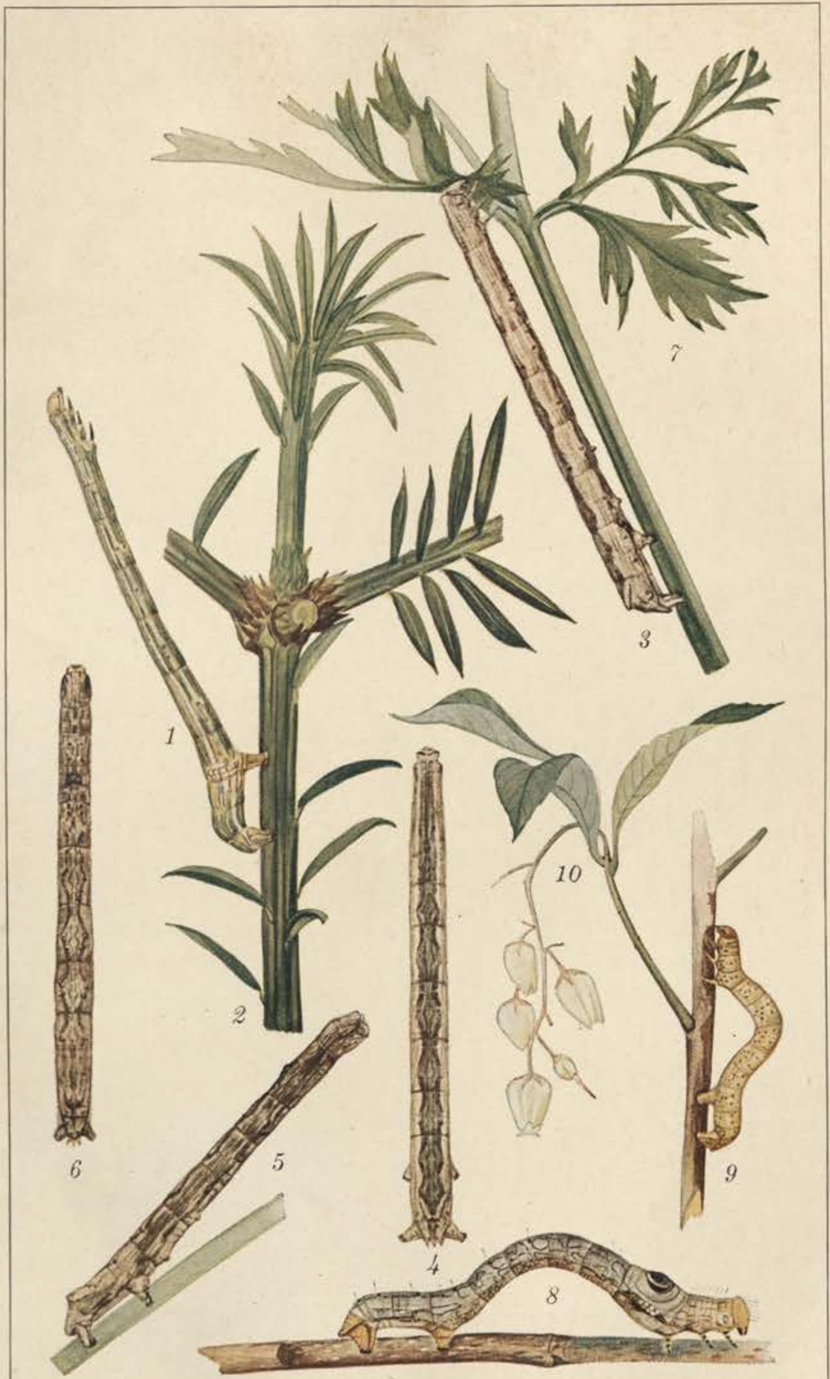


PLATE 1. JAPANESE LEPIDOPTERA

# DRITTER BEITRAG ZUR KENNTNIS DER LYCIDÆ

## DIE NEUE GATTUNG LEPTOTRICHALUS

VON R. KLEINE
*Stettin, Prussia*

ZWEI TAFELN

### VORBEMERKUNG

Die Zahl der bekannten Lyciden ist beträchtlich, namentlich Bourgeois und Waterhouse haben zahlreiche Arten beschrieben. Was die systematischen Studien dieser interessanten Familie erschwert ist das gänzliche Fehlen zusammenhängender Arbeiten.

Bei meinen Studien habe ich die Erfahrung gemacht dass die artliche Festlegung zuweilen auf grosse Schwierigkeiten stösst. Nicht nur die Ausfärbung ist grossen Schwankungen unterworfen, auch habituelle Einzelheiten, namentlich an Fühlern, Prothorax, und Elytren sind nicht so konstant, dass damit difficile Arten zu trennen wären. Ich bin daher dazu übergegangen den Penis in ausgedehntestem Umfange zur Arttrennung heranzuziehen. Dies Verfahren hat sich als allein gebrauchsfähig erwiesen und ist in der nachstehenden Arbeit zur Anwendung gekommen.

Für die Bearbeitung neuer Arten wird damit jede Unklarheit vermieden; schwieriger ist es die schon beschriebenen Arten älterer Autoren zu deuten. Handelt es sich um markante Formen, so wird es noch möglich sein, eine sichere Feststellung vorzunehmen; bei sehr ähnlichen Arten indessen wird es, sobald nahestehende Formen gefunden sind, schwer werden zu sagen ob die angenommene Art mit der des Autors übereinstimmt. Auf jeden Fall wird alles versucht werden Klarheit zu schaffen. Es sollte keine Art ohne Abbildung wichtiger Organe oder Organteile publiziert werden, weil sich geringe, aber konstante Unterschiede oftmals garnicht durch Worte wiedergeben lassen.

Bei den hier besprochenen Arten besteht nur Aehnlichkeit zwischen *cyaneiventris* Waterhouse und *dubitabilis* sp. nov. Ich habe die Arten so getrennt, dass ich die am weitaus häufigste und verbreitetste als die Waterhouse'sche angesprochen habe.

Im allgemeinen bin ich meinem Grundsatz, keine neue Art ohne den Mann festzulegen, treu geblieben. Nur in einem Falle glaubte ich eine Ausnahme machen zu können, da die Arten hinreichend verschieden waren.

Nur zwei Arten, die bisher bei *Trichalus* standen, sind bekannt gewesen; neunzehn habe ich neu beschrieben. Nicht weniger als vierzehn sind von den Philippinen und ich bin Herrn Prof. Charles Fuller Baker für seine dauernde Unterstützung sehr zum Dank verpflichtet.

### AELTERE ARTEN

Bis zur Begründung der Gattung sind beschrieben worden: von Kirsch, *cyaniventris*;[1] von Waterhouse, *cyaneiventris* Illiger.[2]

Beide Arten gehören sicher zu *Leptotrichalus*. Ich konnte mich nicht davon überzeugen dass noch andere *Trichalus*-Arten in die Gattung zu übernehmen sind. Bei *Metriorrhynchus* können sich, schon wegen der verkürzten ersten Rippe der Elytren, keine *Leptotrichalus*-Arten finden.

### Genus **LEPTOTRICHALUS**[3] novum

Von der Gestalt eines *Metriorrhynchus*. Kopf mit freier, meist etwas ausgehöhlter Stirn, Rüssel in wechselnder Länge vorhanden, immer aber stumpfer und robuster als bei *Metriorrhynchus*. Fühler lang, bis ins hintere Drittel der Elytren reichend, erstes Glied keulig, zweites sehr klein, im ersten verborgen, die folgenden viel länger als breit, schwach gezähnt, vom dritten bis zum zehnten an Länge, aber wenig an Breite abnehmend, das elfte schmal, lang, elliptisch. Prothorax trapezoid, Vorderrand schmal, Seiten flach geschwungen, Hinterrand wellig, Aussenecken meist spitz, nur eine sehr schmale, mittlere Areole, die den Hinterrand immer, den Vorderrand oft verbindet oder durch einen ganz kurzen undeutlichen Kiel verbunden ist. Hinter der Mitte zuweilen quere Aufwölbungen als kleine Rippen. Schildchen viereckig, Hinterrand mehr oder weniger halbkreisförmig ausgebuchtet. Elytren ähnlich *Trichalus*, erste Rippe nur im basalen Drittel, zweite im hinteren Drittel ganz fehlend oder nur obsolet, dritte und vierte bis dicht an den Deckenrand gehend, Furchen breit, gegittert, Gitterung durch eine flache Rippe getrennt, oder die Rippen fehlend, die Figuren der Gitterung verschieden. Beine schlank, normal, Trochanteren scharf dreieckig. Abdomen normal. Hautflügel, Tafel 1, Fig. 1 und 2.

---

[1] Mitt. Zool. Mus. Dresden 1 (1875) 35 (als *Metriorrhynchus*).

[2] Typ. Spec. Col. I, Lycidae (1879) 72, t. XVII, f. 6 (als *Trichalus*).

[3] ηεπτος schlank, *Trichalus* gen. Lycid.

Typus der Gattung, *Metriorrhynchus cyaniventris* Kirsch.

In Habitus ist *Leptotrichalus* mehr *Metriorrhynchus* nahestehend als *Trichalus.* Die Neigung das Untergesicht zum Rüssel zu verlängern spricht auch dafür. Alle anderen Merkmale sprechen dagegen für Anlehnung an *Trichalus.* Der Prothorax hat nur eine Areole und der Rippenverlauf auf den Elytren ist *Trichalus* sehr ähnlich, wenn er sich auch nicht direkt deckt. Die Gattungen mit verkürzter erste Rippe sind in eine eigene Verwandtschaft zu bringen.

Für die Gattung typisch ist der lange, trapezoide Prothorax und die auffallend langen Fühler, die den anderen, nahestehenden Gattungen fehlen.

### ZERLEGUNG DER GATTUNG IN SYSTEMATISCHE GRUPPEN

Der Versuch die Gattung in kleine, in sich abgeschlossene Gruppen zu zerlegen ist missglückt. Der Habitus ist so in sich abgeschlossen, dass keine Gruppierung der Arten möglich war. Auffallend ist die gänzliche Systemlosigkeit der Penisbildung. Während manche Gattungen der Lycidæ deutliche Verwandtschaft im Penisbau erkennen lassen und dadurch eine natürliche Gruppierung ermöglichen, herrscht hier völlige Regellosigkeit. Ich habe daher, aus rein praktischen Gründen, die Zusamenstellung nach der Körperfarbe vorgenommen.

### GEOGRAPHISCHE VERBREITUNG

Die Gattung ist rein indo-malayisch; vierzehn von den einundzwanzig Arten sind auf den Philippinen endemisch. Auf Celebes fand ich zwei Arten vor, weiter nach Süden und Südosten scheint die Gattung nicht vorgedrungen zu sein. Von den Molukken, Neu-Guinea, und Australien sah ich keine Belegstücke. Die Berührungspunkte mit *Trichalus* sind an den verschiedensten Stellen vorhanden, doch scheint mir das Hauptverbreitungsgebiet von *Trichalus* mehr austro-malayisch zu sein.

Ganz auffällig gering ist der Artbestand auf Borneo. Es mag das seinen Grund darin haben, dass wir noch zu wenig über die Fauna der Insel wissen. Bisher habe ich nur den weitverbreiteten *cyaniventris* Kirsch von dort gesehen. Java und Sumatra haben je zwei neue Arten gebracht, in Malakka ist noch *cyaniventris* gefunden worden, hier scheint die Westgrenze erreicht zu sein. Im allgemeinen scheinen die *Leptotrichalus*-Arten eine enge Verbreitung zu haben. Nur auf den Philippinen kommen vor:

*Leptotrichalus cereus* sp. nov.
*Leptotrichalus celsus* sp. nov.

*Leptotrichalus dubitabilis* sp. nov.
*Leptotrichalus acidus* sp nov.
*Leptotrichalus acutus* sp. nov.
*Leptotrichalus accuratus* sp. nov.
*Leptotrichalus acerbus* sp. nov.
*Leptotrichalus adolescens* sp. nov.
*Leptotrichalus effeminatus* sp. nov.
*Leptotrichalus circumscriptus* sp. nov.
*Leptotrichalus cicatricosus* sp. nov.
*Leptotrichalus adjunctus* sp. nov.
*Leptotrichalus admirabilis* sp. nov.
*Leptotrichalus cyaneiventris* (Waterhouse).

Mit Ausnahme des nördlichsten Teiles ist die ganze Inselgruppe bewohnt.

Die einzige von Borneo bekannte Art ist noch in Sandakan gefunden worden, scheint aber nicht mehr nach Palawan vorgedrungen zu sein; es wäre interessant zu erfahren wo die Ostgrenze liegt.

Die javanischen Arten *conciliatus* und *concinnus* waren beide aus dem Preanger. Die Sumatraner sind noch zu unklar, *completus* sah ich nur von der Insel Bali, *adversarius* war ohne näheren Fundort.

Auf Celebes kommen *acclinus* und *accomodatus* vor.

### *Bestimmungstabelle der Leptotrichalus-Arten.*

1. Oberseite des Körpers einfarbig rotorange bis lehmgelb, Elytren ohne schwarze Färbung im Spitzenteil........ 2.[4]
Oberseite des Körpers ganz schwarz oder wenigstens die Elytren im Spitzenteil mehr oder weniger schwarz oder graubraun........ 9.
2. Penis vorn hakenförmig umgebogen........ **L. conciliatus sp. nov.**
Penis vorn nicht umgebogen........ 3.
3. Penis vorn verbreitert, Präputialteil lang elliptisch, breiter als der Stiel und deutlich von diesem abgesetzt........ **L. cyaneiventris (Waterhouse).**
Penis von verschiedener Gestalt, vorn aber nicht erweitert........ 4.
4. Penis vorn keulig verdickt........ 5.
Penis vorn nicht keulig verdickt........ 6.
5. Präputium auf der Unterseite mit einer halbelliptischen Vertiefung. **L. acclinus sp. nov.**
Präputium mit drei deutlichen, hyalinen, vertieften Stellen. **L. celsus sp. nov.**
6. Penis vor dem erweiterten Präputium taillenartig verengt. **L. accuratus sp. nov.**
Penis vorn spitz zulaufend........ 7.
7. Penis mit sehr grossem Präputialteil und langer, dornartiger Einlage. **L. dubitabilis sp. nov.**

---

[4] Arten mit gelben und mehr oder weniger schwarzen Elytren (Farbendimorphie) sind in beiden Abteilungen aufgeführt.

Penis lang elliptisch, sehr spitz, in Seitenansicht keine dornartige Einlage ........ 8.
8. Penis beiderseits lang elliptisch zugespitzt ........ **L. cereus** sp. nov.
Penis mehr lineal, Seiten wellig gebogen ........ **L. adversarius** sp. nov.
9. Einfarbig schwarze Arten ........ 10.
Nur zum Teil und dann nur auf den Elytren schwarz oder dunkel ........ 12.
10. Penis mit spitzem Präputium ........ **L. acidus** sp. nov.
Penis mit keuligem Präputium ........ 11.
11. Seiten des Präputiums mit hellen, durchsichtigen Stellen. **L. acutus** sp. nov.
Präputium nur an der Spitze aufgehellt ........ **L. cyaniventris** (Kirsch).
12. Es ist nur der Prothorax ganz oder zum Teil gelb, Elytren schwarz, ganz selten ist auch die Basis in geringer Ausdehnung gelb ........ 13.
Die dunklen Partieen auf den Elytren liegen immer im Spitzenteil und nehmen selten mehr als die Hälfte des Organes ein ........ 15.
13. Penis hinter dem Präputium taillenartig verengt ........ **L. accuratus** sp. nov.
Nicht taillenartig verengt ........ 14.
14. Penis lanzettlich, unterseits ohne blattartige Anhänge. **L. accomodatus** sp. nov.
Penis filiform, Präputium etwas erweitert, Unterseits mit blattartigen Anhängen ........ **L. acerbus** sp. nov.
15. Die Elytrenspitze ist nur hellbraun angedunkelt ........ 16.
Die Elytrenspitze ist dunkelbraun bis schwärzlich ........ 17.
16. Penis mit hakenartigem Präputium ........ **L. completus** sp. nov.
Penis mit linealen Anhängen am Präputium ........ **L. adolescens** sp. nov.
17. Elytren mit Ausnahme des Spitzenteils ziegelrot, Schildchen schwarz. **L. concinnus** sp. nov.
Elytren lehmgelb, Schildchen nicht schwarz ........ 18.
18. Erste und zweite Rippe stark verkürzt, dritte auffallend erhöht. **L. circumscriptus** sp. nov.
Nur die erste Rippe verkürzt, alle anderen normal und nicht auffällig erhöht ........ 19.
19. Präputium nicht keulig verdickt ........ **L. effeminatus** sp. nov.
Präputium keulig verdickt ........ 20.
20. Penis vor dem erweiterten Präputium zungenförmig, schmal. **L. cicatricosus** sp. nov.
Nicht zungenförmig schmal ........ 21.
21. Präputium seitlich mit hyalinen Stellen ........ **L. adjunctus** sp. nov.
Ohne hyaline Stellen, unterseits mit saugnapfartigen Platten. **L. admirabilis** sp. nov.

### **Leptotrichalus conciliatus** sp. nov. Tafel 1, Fig. 3.

Die ganze Unterseite des Körpers, Kopf, Fühler, Beine, zuweilen auch das Schildchen schwarz, mit schwachem, metallischem Anflug, Fühler mit Neigung zu dunkler Braunfärbung, Prothorax und Elytren, meist auch das Schildchen dunkel, schmutzig-ziegelrot. Hinterecken des Prothorax spitz vorgezogen, Areolen vorn und hinten offen. Erste Rippe der Elytren sehr kurz, zweite kaum bis zur Mitte reichend, Rippenbildung gleich *completus* aber allgemein robuster und verschwommener.

Länge, 9 bis 14 Millimeter; Breite (hum.), 2.5 bis 3.

Java. G. Tjerimai, ruhender Vulkan an der Nordküste, Preanger, X–XII–I (*Drescher*). Typen in der Sammlung Drescher und in meinem Besitz. Zwei Männchen, 5 Weibchen.

Mit *completus* nahe verwandt, auch dasselbe Begattungsorgan ist beiden Arten eigen. Ich halte beide Arten für gut und sicher getrennt, sie sind nicht nur durch die ganz andere Ausfärbung sondern auch durch den Fühlerbau und den spitz vorgezogenen Prothorax unterschieden. Die Variation der roten Farbenpartieen ist gering und neigt zur Braunfärbung. Wahrscheinlich ist *completus* eine insulare Vicariante.

**Leptotrichalus acclinus** sp. nov. Tafel 1, Fig. 4; Tafel 2, Fig. 1.

Prothorax, Schildchen, Elytren, Prosternum, Mesosternum, und die Schenkelbasis der Vorder- und Mittelbeine hell lehmgelb, sonst schwarz, Abdomen immer, Sternum zuweilen blaumetallisch glänzend. Areole des Prothorax hinten offen, mit dem Vorderrande durch einen kurzen, flachen Kiel verbunden, hinter der Mitte mit flachen Querwülsten. Schildchen tief halbkreisförmig eingebuchtet, erste Rippe nur im basalen Drittel, zweite bis weit gegen den Deckenrand reichend aber kürzer als die dritte Rippe, Gitterung durch eine schmale Rippe getrennt, Gestalt der Gitter immer rechteckig, meist genau gegenüberliegend, Rippen und Gitterung dicht behaart. Unterseite des Körpers zerstreut, hell und anliegend behaart.

Weibchen durch die etwas kurzen, aber gleichgestalteten Fühler in üblicher Weise durch das anders gebaute Abdomen gekennzeichnet.

Länge, 11 bis 16 Millimeter; Breite (hum.), 2 bis 3.5.

Süd-Celebes, Patunuang (*Fruhstorfer*). Ost-Celebes, Tomboegae Bonthain (*Ribbe*). Typen im Dresdener Museum und in meinem Besitz.

**Leptotrichalus cyaneiventris** (Waterhouse). Tafel 1, Fig. 5; Tafel 2, Fig. 2.

*Trichalus cyaneiventris* ILLIGER, Typ. Spec. Col. I, Lycidæ (1879) 72, t. XVII, f. 6.

Philippinen: Baguio, Provinz Benguet, Luzon; Butuan, Mindanao; Mount Maquiling, Provinz Laguna, Luzon; Nordwestliches Panay; Zamboanga, Mindanao; Davao, Mindanao; Kolambugan, Mindanao.

Die Variation ist so gross wie bei *dubitabilis*, zwischen orangerot und lehmgelb schwankend. Von Kolambugan sah ich nur orangerote Stücke; die Zugehörigkeit zur Art ist durch Penisautopsie gesichert.

**Leptotrichalus celsus** sp. nov. Tafel 2, Fig. 3.

Von *accuratus* äusserlich nicht zu unterscheiden, durch die Gestalt des Penis verschieden.

Länge, 9 Millimeter; Breite (hum.), 2.

Philippinen; Surigao, Mindanao (*Baker*). Typus in meiner Sammlung.

**Leptotrichalus cereus** sp. nov. Tafel 2, Fig. 4.

Gleichfalls mit *accuratus* verwandt und äusserlich nicht zu trennen. Durch den Penis sicher zu unterscheiden.

Länge, 9 Millimeter; Breite (hum.), circa 2.

Philippinen: Butuan, Mindanao; Surigao, Mindanao; Kolambugan, Mindanao (*Baker*), 4 Männchen.

Die Untersuchung diese Materials hat klar gezeigt, dass der ganze sich um *cyaneiventris* scharende Verwandtschaftskreis nur durch Untersuchung des Begattungsorganes feststellen lässt. Habituelle, äussere Unterschiede waren trotz eingehender Untersuchung nicht festzustellen. Die weiblichen Tiere waren nicht zu trennen. Die Verwandtschaftsverhältnisse sind bei den Lyciden viel komplizierter als die älteren Autoren angenommen haben.

**Leptotrichalus adversarius** sp. nov. Tafel 2, Fig. 5 und 6.

Erdbraun, Elytren, aber nicht das Schildchen, schmutzigziegelrot, Elytren matt, sonst schwach glänzend. Fühler lang, schlank, zweites Glied ringförmig, nicht im ersten verborgen, vom dritten ab einzeln, lang behaart. Areole des Prothorax lang, schmal, den Vorder- und Hinterrand berührend, Punktierung am Vorder- und Seitenrand schwach, Behaarung dicht, Erste Rippe auf den Elytren sehr kurz, zweite auf der Mitte schwach werdend, an der Basis und gegen den Hinterrand deutlicher, aber immer schwächer als die übrigen, Sekundärrippen schwach, undeutlich, Gitterung aus unregelmässigen Figuren bestehend, Behaarung kurz, dicht. Beine sehr schlank. Unterseite des Körpers ganz allgemein kurz und dicht behaart. Penis von robuster, gedrungener Gestalt, stark hyalin.

Länge, 8.5 Millimeter; Breite (hum.), 2.

Sumatra. Typus im Dahlemer Museum.

Eine gewisse Aehnlichkeit besteht mit *accuratus*, bei dem zuweilen ebenfalls eine Verdunkelung des Prothorax und Schildchens eintritt. Die Grundfarbe ist bei jener Art aber kein rot, sondern ein reines, helles lehmgelb. Ferner sind die Schenkel nicht an der Basis aufgehellt. Auf jeden Fall trennt die Form des Penis sehr leicht und beseitigt jeden Zweifel.

**Leptotrichalus dubitabilis** sp. nov. Tafel 1, Fig. 6; Tafel 2, Fig. 7.

Habituel von *cyaneiventris* (Waterhouse) nicht zu trennen, nur durch den gänzlich anders gebauten Penis leicht zu unterscheiden. Einen gewissen Anhalt gewährt die Unterseite des Körpers insofern als die Vorderbrust, die Coxen der Vorder- und Mittelbeine, und zuweilen auch die Schenkelbasis hellgelb ist, das ist bei *cyaneiventris* meist nicht der Fall, kommt aber vor, das Merkmal hat also nur bedingten Wert.

Länge, 9 bis 15 Millimeter; Breite (hum.), 2 bis 3.25.

Philippinen: Sibuyan; Mount Maquiling, Luzon; Cuernos Gebirge, Negros; Polillo (*Baker*); Iligan, Butuan, Kolambugan, Zamboanga, Surigao, und Dapitan, Mindanao; Nordwestliches Panay; Nueva Vizcaya; Basilan; Baguio, Benguet. Typen in meinem Besitz. Neunzehn Exemplare gesehen.

Die Stücke von Sibuyan sind mehr rotgelb, alle anderen lehmgelb, sonstige Abweichungen waren nicht festzustellen.

**Leptotrichalus acidus** sp. nov. Tafel 1, Fig. 7 und 8; Tafel 2, Fig. 8.

Mit *acerbus* sehr nahe verwandt und ohne Penisvergleich schwer zu trennen, Ausfärbung wie dort, der Prothorax meist in der hinteren Hälfte und in der Spitzenpartie gelblich, kann aber auch ganz gelb werden. Fühler viel gedrungener als bei jener Art, namentlich tritt das bei den mittleren Gliedern auffällig hervor. Prothorax mit etwas kräftigen, mittleren Querwülsten. Punktierung am Vorderrand kräftig, sonst fehlend. Alles übrige gleich *acerbus*. Im Gegensatz zu *acerbus* ist der Penis mit Ausnahme des Spitzenteiles stark pigmentiert; die Form ist eine total andere.

Länge, 7 bis 9 Millimeter; Breite (hum.), circa 2.

Philippinen: Mount Maquiling, Provinz Laguna, Luzon; Sibuyan; Mount Banahao, Luzon (*Baker*). Typen im Dresdener Museum. Zwölf Exemplare gesehen. Wesentliche Variationen waren nicht festzustellen.

**Leptotrichalus acutus** sp. nov. Tafel 1, Fig. 10; Tafel 2, Fig. 9.

Einfarbig grauschwarz, durch die am ganzen Körper vorhandene seidige, dichte Behaarung grauglänzend. Prothorax zuweilen an den hinteren Aussenecken etwas heller, braungelb.

Kopf und Fühler normal. Prothorax sehr schlank, in der Mitte, an der Einmündungsstelle der Querrunzeln meist winklig nach innen gebogen, Punktierung an den Rändern meist nur in einer Reihe, grob, tief. Rippenverlauf auf den Elytren normal, Gitterung gleich *accomodatus*. Beine und Abdomen normal. Penis mit grossem, stark verdicktem, hyalinen Präputium, der stielartige, hintere Teil dunkler pigmentiert.

Länge, 7 bis 9 Millimeter; Breite (hum.), circa 2.

Philippinen: Los Baños; Mount Maquiling, Provinz Laguna, Luzon; Mount Banahao, Luzon (*Baker*). Typen im Dresdener Museum, Cotypen in meinem Besitz. Ein Männchen, 3 Weibchen gesehen.

Auf den Elytren können die Rippen stark erhöht sein. Der Penisvergleich hat aber ergeben dass es sich nur um *acutus* und nicht um eine eigene Art handelt.

**Leptotrichalus cyaniventris** (Kirsch). Tafel 2, Fig. 10.

*Metriorrhynchus cyaniventris* KIRSCH, Mitt. Zool. Mus. Dresden 1 (1875) 35.

Malakka (Typus), Sumatra: Deli Sibolangit (*Jachan*), Boekit Gabah, ein Berg an der Südwestküste Sumatras oberhalb Benkoelen, Urwald, 2,000 bis 3,000 Fuss hoch (*Drescher*), Ostküste Brastagi, 1,300 Meter hoch (*Corporaal*); Deli, Ober-Langkat (*Reinsch*), Mentawei: Sipora, Sereinu (*Modigliani*); Java, W. Silabintanah (*G. E. Bryant*), G. Slamat, Vulkan an der Südküste Midden Java (*Drescher*); Südost Borneo, Nordost Borneo, Sandakan (*Baker*), West Sarawak, Mount Matang, Mount Merinjak, Quop (*Bryant*).

Nennenswerte Variationen konnte ich nicht nachweisen. Auf Borneo kommt eine Form vor, deren Rippen und Gitterung an der Basis hellbraun behaart ist und damit an einen Typus erinnert, der auch in anderen Gattungen vorkommt und in Borneo nicht selten ist. Durch Penisvergleich ist die Uebereinstimmung mit der typischen Form sichergestellt. Es finden sich auch Uebergänge.

**Leptotrichalus acerbus** sp. nov. Tafel 1, Fig. 9, 11, und 12.

Prothorax mehr oder weniger, immer aber noch gegen die Hinterecken, meist das Schildchen, zuweilen auch die Schenkel an der Basis gelbbraun, sonst pechschwarz. Kopf normal. Fühler sehr schlank, sonst normal. Prothorax am Uebergang vom Vorder- zum Seitenrand stumpf-eckig, Areole sehr schmal, mit kurzem, stumpfem Kiel mit dem Vorderrand verbunden, an den Rändern grob, zuweilen undeutlich punktiert, überall anliegend behaart. Erste Rippe der Elytren kurz, zweite bis hinter die Mitte reichend, Gitterung gleich *accomodatus*. Beine und Unterkörper normal. Penis schlank, hyalin, in Aufsicht von oben keulenförmig. Seitenansicht, Tafel 1, Fig. 12.

Länge, 7 bis 8.5 Millimeter; Breite (hum.), circa 2.

Philippinen: Imugan, Provinz Nueva Vizcaya, Luzon (*Baker*). Männchen, Type im Dresdener Museum, Weibchen in meinem Besitz.

Es lagen mir achtundzwanzig Stück vor, die alle, auch die aus Coll. Baker, von demselben Fundort stammten. Die Variation ist gering und hält sich in den in der Diagnose angegebenen Grenzen.

**Leptotrichalus accuratus** sp. nov. Tafel 2, Fig. 11.

Mit *acclinus* sehr nahe verwandt und nur durch die viel schlankeren Fühler unterschieden. Durch den in der Abbildung dargestellten Penis leicht und sicher zu trennen. Bei manchen Stücken sind Schildchen und Prothorax leicht gebräunt.

Länge, 6 bis 11 Millimeter; Breite (hum.) 2 bis 3.

Philippinen: Mount Banahao, Los Baños; Mount Maquiling, Provinz Laguna; Butuan, Mindanao; Sibuyan (*Baker*). Typen im Dresdener Museum.

Die Variation dieser Art ist sehr gross. Die einfarbigen Formen schwanken in der Farbe der Körperoberseite von orangerot bis lehmgelb. Die Elytren können die helle Farbe in grosser Ausdehnung verlieren und schwarz werden. So hatten alle Stücke, die ich von Sibuyan sah, schwarze Elytren, entweder ganz oder wenigstens teilweise. Ferner ist die Intensität der Rippenbildung sehr verschieden. Alle mir zur Verfügung stehenden Stücke sind auf den Penis untersucht, stets ist absolute Sicherheit der Art festgestellt.

**Leptotrichalus accomodatus** sp. nov. Tafel 1, Fig. 13; Tafel 2, Fig. 12.

Prothorax hell gelbbraun, basale Fühlerglieder, Trochanteren und Basis aller Schenkel bräunlich, Abdomen blaumetallisch, sonst rauchschwarz. Rüssel nur mässig verlängert, aber sehr bestimmt vorhanden. Prothorax an den tief eingesenkten Rändern grob, kräftig punktiert. Elytren mit sehr kurzer erste Rippe, zweite im vorderen Drittel verlaufend und dann nur noch unsicher zu erkennen, nur durch die doppelte Zahl der Gitterfiguren erkennbar, Gitterung zum Teil flach, ohne trennende Sekundärrippen, die Gitterfiguren ungleich, Behaarung schwach, nur im basalen Teil deutlicher.

Länge, 10 bis 12 Millimeter; Breite (hum.), 2.3 bis 2.8.

Süd-Celebes: Patunuang, Samanga, Bonthain (*Ribbe*, Berliner Museum) (*Fruhstorfer*). Typen im Dresdener Museum und in meinem Besitz.

**Leptotrichalus completus** sp. nov. Tafel 1, Fig. 14.

Unterseite des Körpers, Fühler und Kopf in wechselnder Tiefe braun bis schwarz, Prothorax, Schildchen, und die Elytren in der basalen Hälfte lehmgelb, Spitzenhälfte hell- bis dunkelbraun. Rüssel von mittlerer Länge, Mandibeln schmal. Fühler schlank, beim Weibchen sind die einzelnen Glieder etwas kürzer als beim Männchen. Prothorax gleich *acerbus*. Elytren wie der Prothorax speckig glänzend, die Primärrippen erhöht aber wenig scharf, Furchengitterung quadratisch, deutlich. Beine braun, Schenkel an der Basis heller, Vorderbeine ganz allgemein heller.

Länge, 10 Millimeter; Breite (hum.), circa 2.

Bali, Kintamani, und Moendaek (*Drescher*), 2 Männchen und Weibchen. Typen in der Sammlung Drescher und in meinem Besitz.

Es muss sich um eine sehr stark variierende Art handeln, die nach der Körperfarbe kaum bestimmbar ist. Die braune Farbe findet sich in allen Tiefen, auf den Elytren können die beiden Farbenkomplexe in einander übergehen.

Aehnlichkeit besteht nur mit *cicatricosus*, von der die Gestalt des Prothorax leicht trennt. Bei ersterer Art erweitert sich das Organ nach den Hinterecken stark, ist aber mehr von trapezoider Form, bei *completus* dagegen sind die Seiten fast gerade. Der Penis hat eine ganz eigentümliche Gestalt, findet sich aber bei *conciliatus*, der sonst ganz abweichend gebaut ist, wieder.

**Leptotrichalus adolescens** sp. nov. Tafel 1, Fig. 15; Tafel 2, Fig. 13.

Kopf, Rüssel, erstes bis drittes Fühlerglied, Prothorax, Elytren mit Ausnahme der Spitze, Beine und Sternum hell okergelb, Fühler vom vierten Gliede an braunschwarz, Oberkanten der Schenkel, Tarsen und die Deckenspitzen hellbraun, Abdomen blaumetallisch. Kopf und Fühler normal. Rippen auf den Elytren von normaler Länge, Primärrippen mässig, Sekundärrippen kräftig entwickelt, Gitterung sich deutlich von der Grundfläche abhebend, rechteckig bis quadratisch, Rippen und Gitterung sehr dicht behaart. Beine von normaler Gestalt, Schenkel wenig zusammengedrückt. Penis sehr zart, nur die Aussenhaut schwach hellgelb pigmentiert, sonst durchsichtig, Stiel schmal und lang, in Aufsicht an dem dolchartigen Präputium mit lyraartigen, durchsichtigen Anhängen, bei Seitenansicht erweitert sich das Präputium blasenartig nach unten.

Länge, 7.5 Millimeter; Breite (hum.), circa 2.

Philippinen: Mount Maquiling, Luzon. Alle gesehenen Stücke von diesem Fundort (*Baker*). Männchen, Typus im Dresdener Museum, Weibchen in meinem Besitz.

Gehört durch die Art der Rippenbildung zur *adjunctus*-Gruppe.

**Leptotrichalus concinnus** sp. nov.

Schwarz, nur der Prothorax und die Elytren in den basalen zwei Dritteln hell ziegelrot. Fühler wie bei *conciliatus*. Areole des Prothorax am Vorder- und Hinterrand geschlossen, Hinterecken nur wenig vorgezogen, dicht behaart. Die Primärrippen der Elytren stark convex, die Sekundärrippen nur schwach entwickelt, Gitterung meist quadratisch, Rippen und Gitterung sind mit ganz kurzer, dichter gekrümmter Behaarung besetzt.

Länge, 9 bis 10 Millimeter; Breite (hum.), 2 bis 2.5.

Java: G. Papandajan, Vulkan im Preanger, West Java (*Drescher*). Typen in dessen Besitz. Vier Weibchen gesehen.

Leider stand kein Männchen zur Verfügung um den Begattungsapparat zu prüfen. Es besteht aber vorläufig mit keiner anderen Art der Gattung Aehnlichkeit, die zu Verwechslung führen könnte. Die schwarzen Farbenpartieen heben sich von den roten scharf ab, namentlich das schwarze Schildchen. Die Variation scheint sich in erster Linie auf die Ausfärbung des Prothorax zu erstrecken, denn es kommen Stücke mit starker Neigung zur Schwarzfärbung vor.

**Leptotrichalus effeminatus** sp. nov. Tafel 1, Fig. 16; Tafel 2, Fig. 14.

Abdomen und Metasternum schwärzlich, mit schwachem Metallglanz, das letzte Abdominalsegment zuweilen schmutzig-gelb, Prosternum desgleichen, Beine mehr oder weniger braun in wechselnder Tiefe und Umfang, Kopf und Fühler dunkelbraun, Prothorax, Schildchen, und Elytren lehmgelb, letztere am Hinterrande zuweilen mit einem kleinen, schwärzlichen Wisch.

Länge, 6 bis 8 Millimeter; Breite (hum.), 2 bis 2.2.

Philippinen: Surigao, Mindanao; Kolambugan, Mindanao (*Baker*). Typen in meinem Besitz. Sieben Exemplare gesehen.

Ohne Penisautopsie von *admirabilis* und *celsus* nicht zu trennen. Die schwarzen Flecken auf den Elytren können recht tief in Farbe sein, bei reichem Material dürfte indessen hellbraune Farbe vorherrschen. Bei dunklen Stücken nimmt der Prothorax braune Farbe an; fehlen die Elytrenflecke, so sind auch die Beine hell.

**Leptotrichalus circumscriptus** sp. nov. Tafel 1, Fig. 17; Tafel 2, Fig. 15.

Mit *admirabilis* in einem Verwandtschaftskreis stehend und ausser dem ganz anders geformten Penis durch die Färbung der Elytren unterschieden. Die schwarze Farbe ist bei manchen Stücken an den Seitenrändern bis zum Humerus erweitert, ebenso ist die Sutura in mehr oder weniger grossem Umfang geschwärzt und im Spitzenteil laufen die beiden schwarzen Partieen zusammen. Die Verdunklung erstreckt sich bei dunklen Stücken auch auf das Schildchen, selbst der Prothorax ist etwas angedunkelt. Bei ganz tiefdunklen Tieren ist ferner der Kopf und die Körperunterseite schwarz. Die Ausfärbung ist also sehr variabel. Auf den Elytren ist die erste Rippe sehr kurz, die zweite endigt vor der Mitte, die dritte ist sehr stark erhöht, die vierte desgleichen, aber nur schwach ausgebildet.

Länge, 7.5 bis 8 Millimeter; Breite (hum.), circa 1.75.

Philippinen: Surigao, Mindanao; Butuan, Mindanao (*Baker*). Typen in meinem Besitz. Ein Männchen, 5 Weibchen gesehen.

**Leptotrichalus cicatricosus** sp. nov. Tafel 2, Fig. 16.

In die Verwandtschaft von *admirabilis* gehörig aber viel grösser, die Schwarzfärbung der Elytren ist ausgedehnter, tiefer schwarz und grenzt gegen die gelbe Farbenzone scharfrandig ab. Penis schlank, vorn mässig verdickt, keulig, sehr hellfarbig, fast hyalin, von *admirabilis* durch den Penis sicher und leicht zu unterscheiden.

Länge, 9 bis 10 Millimeter; Breite (hum.), circa 2.

Philippinen: Panay (Nordwest); Surigao, Mindanao; Butuan, Mindanao; Cuernos Gebirge, Negros (*Baker*). Typus in meiner Sammlung.

Ein Männchen, 3 Weibchen gesehen.

**Leptotrichalus adjunctus** sp. nov. Tafel 1, Fig. 18; Tafel 2, Fig. 17.

Prothorax und Elytren lehmgelb, letztere an der Spitze schwarz oder schwarzbraun; Kopf, Fühler, und Vorderbeine dunkler braun, Mittel- und Hinterbeine, Sternum, und Abdomen blaumetallisch, Unterseite des Körpers glänzend, sonst matt. Kopf und Fühler normal. Prothorax seitlich nur wenig und sanft nach innen geschwungen, Randpunktierung zart, undeutlich. Elytren mit sehr schwachen Primär- und kräftigen Sekundärrippen, Gitterung aus rechteckigen, gleichmässigen Figuren gebildet, ähnlich *acclinus*, überall einzeln, kurz behaart. Mittel- und Hinterschenkel seitlich stark zusammengedrückt. Penis keulig, Stiel tief braunschwarz pigmentiert, Präputium heller.

Länge, 10 bis 13 Millimeter; Breite (hum.), 2.5 bis 3.

Philippinen: Mount Banahao, Luzon; Baguio, Provinz Benguet; Sibuyan (*Baker*). Typen im Dresdener Museum. Zehn Exemplare gesehen.

Durch die schwache Ausbildung der Primärrippen und stärkeres Hervortreten der Sekundärrippen merkwürdig. Es hat dadurch den Anschein, als ob eine besondere Gattung, mit neun Rippen, vorliegt. In Wirklichkeit ist das aber nicht der Fall, und es kann keinem Zweifel unterliegen, dass *adjunctus* nur zu *Leptotrichalus* gehören kann. Alle anderen für die Gattung typischen Merkmale sind normal ausgeprägt.

Die Variation ist auch bei dieser Art sehr beträchtlich. Die schwarze Färbung der Elytren kann sich auf die äusserste Spitze beschränken und tiefschwarz oder nur mehr oder weniger grauschwarz sein, sie kann aber soweit an Ausdehnung gewinnen dass nur das basale Drittel übrig bleibt. Es lassen sich alle Uebergänge an Ausdehnung und Tiefe nachweisen. Beide Geschlechter sind der Variation gleich stark unterworfen.

**Leptotrichalus admirabilis** sp. nov. Tafel 1, Fig. 19, 20, und 21; Tafel 2, Fig. 18.

Prothorax lehmgelb, Elytren in der basalen Hälfte von gleicher Farbe; am Humerus seitlich beginnend wird die Spitzenhälfte von erdgrauer Farbe, Kopf schwärzlich, Rüssel mehr oder weniger braun, Schenkel an der Basis gelbbraun, im übrigen sind die Beine von braungrauer Farbe, Sternum braun in wechselnder Tiefe, Abdomen schwärzlich, metallisch. Kopf und Fühler normal, Prothorax sehr schlank, länger als an der Basis breit, der hinter der Mitte liegende Querwulst flach, Behaarung dicht. Elytren mit normal langen, deutlichen, kräftigen Primärrippen, Gitterung deutlich, scharfkantig, Figuren wie bei *accomodatus*. Schenkel flach zusammengedrückt. Abdomen normal.

Länge, 5 bis 10 Millimeter; Breite (hum.), 1.5 bis 2.

Philippinen: Mount Banahao, Luzon; Mount Maquiling, Provinz Laguna, Luzon (*Baker*). Typen in meinem Besitz. Sechsundzwanzig Männchen, 19 Weibchen gesehen.

Die dunkle Farbe auf den Elytren kann sehr wechseln, sowohl in Tiefe wie in Ausdehnung, selbst in der Grösse kommen erhebliche Differenzen vor. Die schwarze Partie der Elytren schneidet nach vorn niemals scharf ab, sondern verläuft allmählich. Auch auf der Körperunterseite wechseln die Farben zwischen schwarz und gelb.

**Leptotrichalus femoralis**[6] sp. nov. Tafel 1, Fig. 22, 23, und 24.

Habituell und in Ausfärbung ganz mit *cyaneiventris* und *dubitabilis* übereinstimmend, durch die Gestalt der Hinterbeine des Männchens und durch den Penis unterschieden.

*Männchen.*—Schenkel der Hinterbeine stark verdickt, aber wechselnd in Stärke, unterseits vor dem Knie immer mit gespaltenem Dorn, Schienen stark gebogen, gegenüber dem Schenkeldorn mit einer tiefen Einkerbung in welcher der Dorn hineinpasst.

*Weibchen.*—Schenkel normal, schlank, kein Schenkeldorn und keine Einkerbung an den Schienen, nur wellige Vertiefungen.

Länge, 12 bis 19 Millimeter; Breite (hum.), 3 bis 5.

Philippinen: Surigao, Mindanao; Kolambugan, Mindanao; Iligan, Mindanao; Butuan, Mindanao (*Baker*). Typen in meinem Besitz. Neunundzwanzig Männchen, 3 Weibchen.

Es kommen alle Farbenabstufungen vor, von hell lehmgelb bis rotorange. Die Stärke der Hinterschenkel geht mit der Körpergrösse korrelativ, doch bleibt auch bei kleinen Tieren der Schenkeldorn immer deutlich. Die genaue Festlegung der Weibchen ist nicht immer leicht, zuweilen fast unmöglich. Kleine Weibchen sind nicht sicher zu deuten.

---

[6] This name is not included in the key for the reason that the description was forwarded by the author as an addendum to the MS. which had been previously submitted.—THE EDITORS.

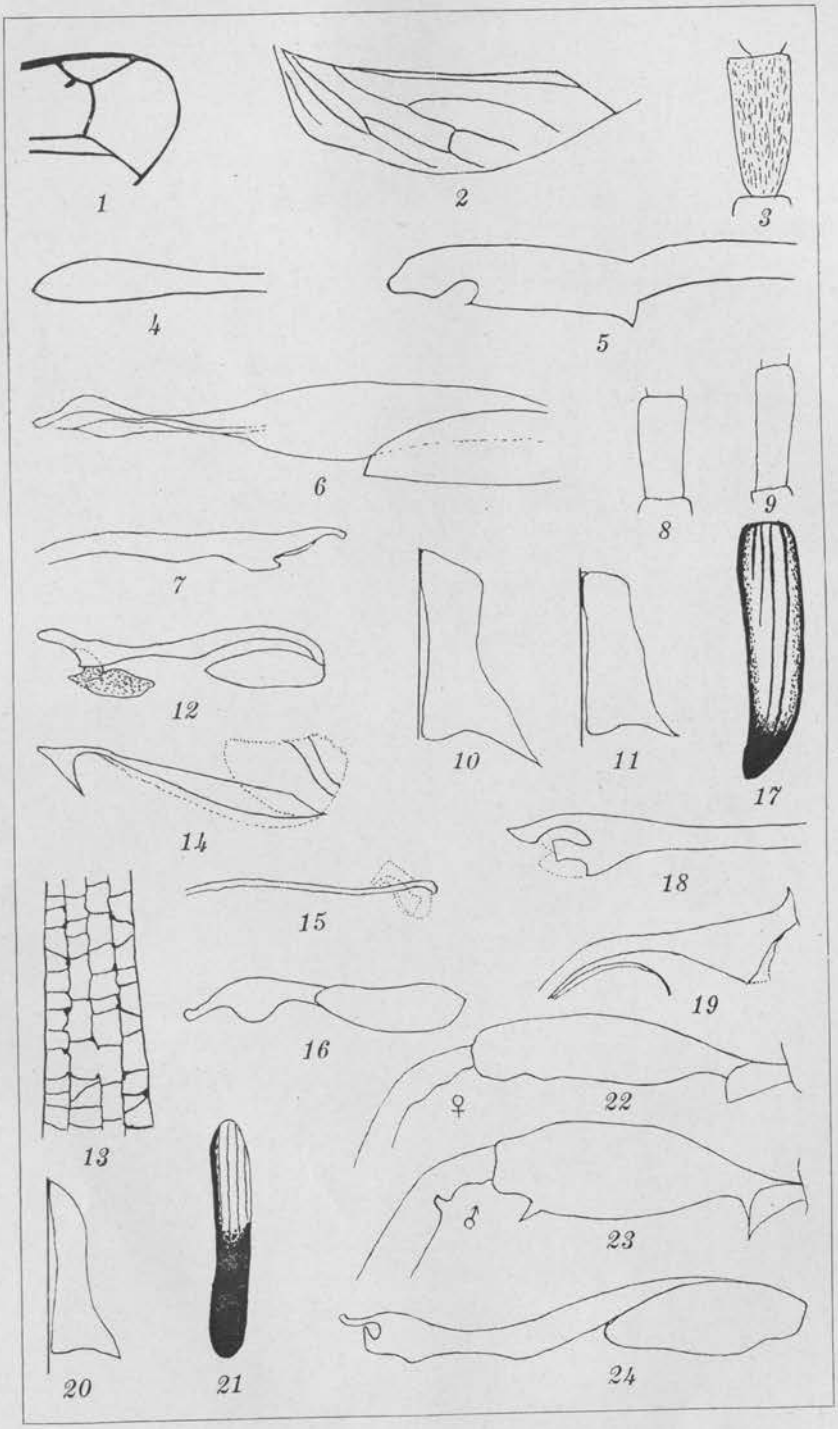
# ILLUSTRATIONEN

## TAFEL 1

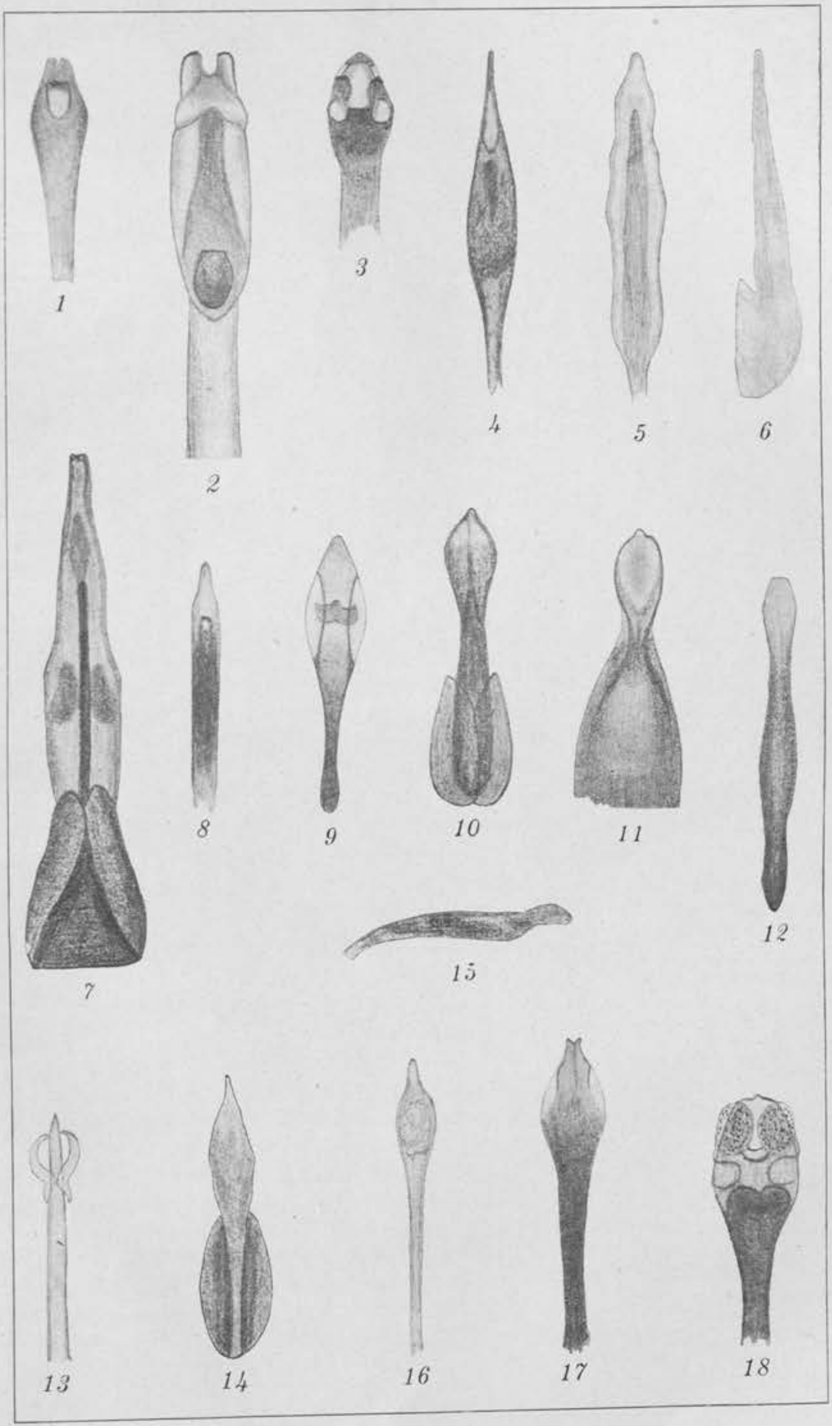
FIG. 1. *Leptotrichalus* g. nov. Aderverlauf der Vorderflügel.
2. *Leptotrichalus* g. nov. Aderverlauf der Unterflügel.
3. *Leptotrichalus conciliatus* sp. nov. Männchen. Viertes Fühlerglied.
4. *Leptotrichalus acclinus* sp. nov. Penis in Seitenansicht.
5. *Leptotrichalus cyaneiventris* (Waterhouse). Penis in Seitenansicht.
6. *Leptotrichalus dubitabilis* sp. nov. Penis in Seitenansicht.
7. *Leptotrichalus acidus* sp. nov. Penis in Seitenansicht.
8. *Leptotrichalus acidus* sp. nov. Mittleres Fühlerglied.
9. *Leptotrichalus acerbus* sp. nov. Mittleres Fühlerglied.
10. *Leptotrichalus acutus* sp. nov. Prothorax.
11. *Leptotrichalus acerbus* sp. nov. Prothorax.
12. *Leptotrichalus acerbus* sp. nov. Penis in Seitenansicht.
13. *Leptotrichalus accomodatus* sp. nov. Elytrengitterung.
14. *Leptotrichalus completus* sp. nov. Penis in Seitenansicht.
15. *Leptotrichalus adolescens* sp. nov. Penis in Seitenansicht.
16. *Leptotrichalus effeminatus* sp. nov. Penis in Seitenansicht.
17. *Leptotrichalus circumscriptus* sp. nov. Elytren.
18. *Leptotrichalus adjunctus* sp. nov. Penis in Seitenansicht.
19. *Leptotrichalus admirabilis* sp. nov. Penis in Seitenansicht.
20. *Leptotrichalus admirabilis* sp. nov. Prothorax.
21. *Leptotrichalus admirabilis* sp. nov. Elytren.
22. *Leptotrichalus femoralis* sp. nov. Hinterschenkel und Schiene des Weibchens.
23. *Leptotrichalus femoralis* sp. nov. Hinterschenkel und Schiene des Männchens.
24. *Leptotrichalus femoralis* sp. nov. Penis.

## TAFEL 2

FIG. 1. *Leptotrichalus acclinus* sp. nov. Penis, Unterseite.
2. *Leptotrichalus cyaneiventris* (Waterhouse). Penis, Unterseite.
3. *Leptotrichalus celsus* sp. nov. Penis, Unterseite.
4. *Leptotrichalus cereus* sp. nov. Penis, Unterseite.
5. *Leptotrichalus adversarius* sp. nov. Penis, Unterseite.
6. *Leptotrichalus adversarius* sp. nov. Penis, Seitenansicht.
7. *Leptotrichalus dubitabilis* sp. nov. Penis, Unterseite.
8. *Leptotrichalus acidus* sp. nov. Penis, Unterseite.
9. *Leptotrichalus acutus* sp. nov. Penis, Unterseite.
10. *Leptotrichalus cyaniventris* (Kirsch). Penis, Unterseite.
11. *Leptotrichalus accuratus* sp. nov. Penis, Unterseite.
12. *Leptotrichalus accomodatus* sp. nov. Penis, Oberseite.
13. *Leptotrichalus adolescens* sp. nov. Penis, Unterseite.
14. *Leptotrichalus effeminatus* sp. nov. Penis, Oberseite.
15. *Leptotrichalus circumscriptus* sp. nov. Penis, Seitenansicht.
16. *Leptotrichalus cicatricosus* sp. nov. Penis, Unterseite.
17. *Leptotrichalus adjunctus* sp. nov. Penis, Oberseite.
18. *Leptotrichalus admirabilis* sp. nov. Penis, Unterseite.



TAFEL 1.



TAFEL 2.

## THE PHILIPPINE BUREAU OF SCIENCE

### MONOGRAPHIC PUBLICATIONS

AMPHIBIANS AND TURTLES OF THE PHILIPPINE ISLANDS. By E. H. Taylor. Order No. 475. Bureau of Science Publication No. 15. Paper, 193 pages, 17 plates, and 9 text figures. Price, $1 United States currency, postpaid.

THE SNAKES OF THE PHILIPPINE ISLANDS. By E. H. Taylor. Order No. 476. Bureau of Science Publication No. 16. Paper, 312 pages, 37 plates, and 32 text figures. Price, $2.50 United States currency, postpaid.

THE LIZARDS OF THE PHILIPPINE ISLANDS. By E. H. Taylor. Order No. 477. Bureau of Science Publication No. 17. Paper, 272 pages, 23 plates, and 53 text figures. Price, $2.50 United States currency, postpaid.

INDEX TO THE GENERA OF BIRDS. By Richard C. McGregor. Order No. 474. Bureau of Science Publication No. 14. Paper, 185 pages. Price, $1 United States currency, postpaid.

AN INTERPRETATION OF RUMPHIUS'S HERBARIUM AMBOINENSE. By E. D. Merrill. Based on the collections made in Amboina by the late Charles Budd Robinson. Order No. 450. Bureau of Science Publication No. 9. Paper, 595 pages and 2 maps. Price, $3 United States currency, postpaid.

SPECIES BLANCOANAE. A critical revision of the Philippine species of plants described by Blanco and by Llanos. By E. D. Merrill. Order No. 461. Bureau of Science Publication No. 12. Paper, 423 pages and 1 map. Price, $2.25 United States currency, postpaid.

VEGETATION OF PHILIPPINE MOUNTAINS. The relation between the environment and physical types at different altitudes. By William H. Brown. Order No. 473. Bureau of Science Publication No. 13. Paper, 434 pages, 41 plates, 30 text figures. Price, $2.50 United States currency, postpaid.

### PLEASE GIVE ORDER NUMBER

Orders for these publications may be sent to the Business Manager, Philippine Journal of Science, Bureau of Science, Manila, P. I., or to any of the following agents:

### AGENTS

THE MACMILLAN COMPANY, 64-66 Fifth Avenue, New York, U. S. A.
WHELDON & WESLEY, Limited, 28 Essex Street, Strand, London, W. C. 2, England.
MARTINUS NIJHOFF, Lange Voorhout 9, The Hague, Holland.
KELLY & WALSH, Limited, 32 Raffles Place, Singapore, Straits Settlements.
THACKER, SPINK & CO., P. O. Box 54, Calcutta, India.
THE MARUZEN CO., Limited, 11-16 Nihonbashi, Tori-Sanchome, Tokyo, Japan.

# CONTENTS

Page.

VAZQUEZ-COLET, ANA. Contribution to the question of dysentery carriers in the Philippine Islands........ 173

LAVA, V. G. The possible use of Philippine coals for liquid fuel........ 193

FISHER, W. S. New Malaysian Cerambycidæ: subfamily Lamiinæ........ 205

FLEUTIAUX, ED. Deux Melasidæ nouveaux des Philippines........ 277

WILEMAN, A. E. Notes on Japanese Lepidoptera and their larvæ: Part IX........ 279

KLEINE, R. Dritter Beitrag zur Kenntnis der Lycidæ: Die Gattung Leptotrichalus........ 295

The Philippine Journal of Science is issued twelve times a year. The sections were discontinued with the completion of Volume XIII (1918).

Yearly subscription, beginning with Volume XIV, 5 dollars United States currency. Single numbers, 50 cents each.

Publications sent in exchange for the Philippine Journal of Science should be addressed: Library, Bureau of Science, Manila, P. I.

Subscriptions may be sent to the BUSINESS MANAGER, Philippine Journal of Science, Bureau of Science, Manila, P. I., or to any of the agents listed on the third page of this cover.

Entered at the post office at Manila, P. I., as second-class matter.